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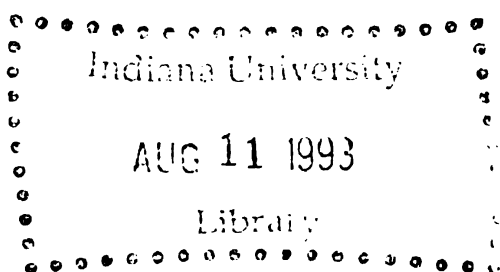
THE FIRST COINAGE OF SIDON
WITH A GALLEY BEARING THE SO-CALLED
TRIANGULAR SAIL

(PLATES 1–2)   J. ELAYI AND A. G. ELAYI

Small silver Sidonian denominations, without inscriptions, bearing on the obverse a war galley with the so-called triangular sail are very few. They have rarely been studied by numismatics, and then only partially.[1] For several reasons we have identified them as the first series, series A, of Sidonian coinage.[2] If we have established a relative chronology, the

[1] E. Babelon, *Catalogue des monnaies grecques de la Bibliothèque Nationale, Les Perses achéménides* (Paris, 1893), p. clxxxiii, fig. 78 and n. 2 (with bibl.), hereafter *Perses*; *Traité* II, 2, p. 550, 888, pl. 118, 4 (mentions only coin 1); J. Rouvier, "Les rois phéniciens de Sidon d'après leurs monnaies sous la dynastie des Achéménides," *RN* 1902, p. 326 (mentions only coin 1); *BMC Phoenicia*, p. xc and pl. 42, 12 (mentions only coin 1); J. W. Betlyon, "Pre-Alexandrine Coinage of Sidon," *ANSMN* 21 (1976), pp. 13–14 and pl. 2, 1–2; J. W. Betlyon, *The Coinage and Mints of Phoenicia. The Pre-Alexandrine Period* (Chico, 1980), pp. 3–4 and pl. 1, 1–2 (mentions coins 1, 2, 3, and 6).

[2] J. Elayi, *Sidon, cité autonome de l'Empire perse* (Paris, 1990), pp. 197–98 (hereafter, *Sidon*).

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absolute one is still uncertain and we have cautiously proposed to date the beginning of this coinage slightly after the middle of the fifth century and to consider that series A probably did not last long. From the coins known to date, we distinguish three groups in this series, according to the iconography of the reverse (archer, corbiesteps, and eye) and the weight.[3] Though surprising, the lack of staters in this series is not impossible since they are also lacking in the first Aradian series.[4] However, the lack of staters cannot be interpreted as a proof for their non-existence, given such a limited documentation;[5] this is compounded by the circumstance that a double shekel of series B may have been overstruck on a double shekel of series A.[6] Alternatively, a coin in the British Museum[7] seems to have, under the hull of its galley, traces of a line of shields which might belong to a galley without a waveline; this would be the case if the obverse of the supposed double shekel of series A was similar to that of the half-shekels of the same series.

The purpose of this article is to present a complete catalogue of this series, to make some new observations, and to propose a new interpretation of the type of the obverse.[8] Our conclusions will obviously benefit from the discovery of new coins of this series.

CATALOGUE OF SIDONIAN SERIES A

Obv.: War galley to l., seen from port side, furled sail with triangular rigging. Border of dots. Rather worn.

Group 1. Rev. Archer standing r., shooting bow held in l. hand, in circular incuse. Border of dots.

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[3] *Sidon*, pp. 203–4.

[4] This series, with the ichthyomorphic deity on the obverse, is known only in thirds of the Persian shekel, adopted as the Aradian standard: see, for example, *BMCPhoenicia*, pl. 1, 1–6.

[5] *Sidon*, p. 204.

[6] F. Imhoof-Blumer, *Monnaies grecques* (Amsterdam, 1883), p. 448, n. 48.

[7] *BMCPhoenicia*, pl. 17, 12; J. Rouvier, "Numismatique des villes de la Phénicie: Sidon," *JIAN* 5 (1902), p. 100, 1081.

[8] For the study of the iconography of the reverse, see J. Elayi, "Les éléments d'architecture sur les monnaies phéniciennes préalexandrines," *NumAntClas* 15 (1986), pp. 65–67; *Sidon*, pp. 203–4.

1. Æ 6.35 g ↑ Plate 1, 1. Kunst Historisches Museum, Vienna, 8. Imhoof-Blumer (above, n. 6), p. 448, 50; E. Babelon, *Mélanges numismatiques* 1 (Paris, 1892), p. 289, 3; *Traité* II, 2, p. 550, 888, and pl. 118, 4; *Perses*, p. clxxxiii, fig. 78 and n. 2; Rouvier (above, n. 1), p. 326; Rouvier (above, n. 7), p. 100, 1081; Betlyon (above, n. 1), pp. 13–14, pl. 2, 1–2, and pp. 3–4, pl. 1, 1–2 (but the weight given on p. 141 is wrong).

Group 2. Rev. Corbiesteps inside circle of dots, all in incuse square.

2. Æ 0.61 g ↖ Plate 1, 2. ANS, 1944.100.71259 (coll. E. T. Newell, acquired in 1922 from the P. Lederer collection).
Betlyon (above, n. 1), p. 13, pl. 2, 2, and p. 3, pl. 1, 2 (but the weight given on p. 141 is wrong); Elayi (above, n. 8), p. 65, n. 26; *Sidon*, pp. 203 and 224, n. 43.

3. Æ 0.54 g ↖ Plate 1, 3.[*] Cab. des Méd., BN Paris, 1965/829[20] (ex Seyrig coll.).
Elayi (above, n. 8), p. 65 and n. 26; Elayi (above, n. 2), pp. 203 and 224, n. 43.

4. Æ 0.45 g ↑ Plate 1, 4. Private coll. Paris = J. L. Malter, *Collector's Journal of Ancient Art* 6/3–4, Winter 1989-90, 513.
Hitherto unpublished.

5. Æ 0.31 g ↑ Plate 1, 5. A. Spaer coll., Jerusalem.
Hitherto unpublished.

Group 3. Rev. Eye inside circle of dots, all in incuse square(?).

6. Æ 0.16 g Plate 1, 6. Cab. des Méd., BN Paris, 1965/829[24] (ex Seyrig coll.).
Sidon, pp. 203 and 224, n. 43.

A metrological study is rendered impossible by the very small number of coins. We can only note that the weight of coin 1, slightly worn, is 6.35 g. Identifying this large denomination is easy: it is a half shekel, which also exists in the next series. This weight is slightly weak[10] compared with the half and double shekels of the next series, the weight

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[*] For a facsimile of this coin, see *Sidon*, p. 74, pl. 3, 7.
[10] As already mentioned by Imhoof-Blumer (above, n. 6), p. 551.

of several of them being respectively more than 7 and 28 g,[11] with reference to a shekel of more than 14 g. This heavy shekel was more or less used until the reign of 'Abd 'aštart I after which the Phoenician standard of Sidon diminished by about 2 g.[12] As far as the four coins of the second group are concerned, we can only note that the closest theoretical weight would be 1/32 shekel, about 0.44 g; similarly for the third group, solely represented by one coin of 0.16 g, the closest theoretical weight would the 1/64 shekel, about 0.22 g. So far, there are fewer denominations (three) for series A than the following series bearing a galley with furled sail (series B), which includes double shekels, 1/2, 1/4, 1/16, and 1/32 shekels.[13] Because of the paucity of the coins in series A, it is as difficult to study the dies as the weights. It can only be noted that coin 3 is too worn, and that 2, 4, and 5 have different obverse and reverse dies.

As for the fabric of this series, it is comparable to that of coins struck before the innovation of the semi-incusion in the first issues of the other Phoenician monetary workshops.[14] The method used for engraving the obverse die is the same used for double shekels and small denominations of the following series. The incuse square technique used on the obverse of the second and third groups of series A, sometimes with curved angles, is also applied to the whole of series B. However, in the first group of series A, the reverse die is circular with a slightly incuse surface; this technique also characterizes for example the first Tyrian issues.[15] The use of the circular reverse incuse previous to the square incuse may seem surprising at first, but it is attested at Tyre as shown by relative chronology,[16] it is also attested by some half-shekels of Sidonian series B with semi-incusion.[17] Therefore, reverse dies with

[11] Eg. *Numismatic and Fine Arts* 16, 2 Dec. 1985, 266 (7.12 g); *Antike Münzen*, 16 April 1957, 302 (28.43 g).

[12] *Sidon*, p. 213.

[13] *Sidon*, pp. 204–7.

[14] *Sidon*, p. 207 (with bibliography).

[15] C. M. Kraay and P. R. S. Moorey, "Two Fifth Century Hoards from the Near East," *RN* 1980, p. 191; *Sidon*, pp. 197–98.

[16] See discussion in *Sidon* which indicates that series A preceded series B.

[17] Eg. *Münzen und Medaillen*, 3–4 Dec. 1965, 483 and pl. 25; *Monnaies et Médailles* 37, 5 Dec. 1968, 271; *Naville* 7, 23 June 1924 (Bement), 1734.

circular and square sections seem to have been used in the same series by the Sidonian engravers.

Small denominations of series A and B have in general a rather regular flan (roughly circular), while some of the double shekels of series B have irregular flans. We have no explanation for such a difference within a single series. Because of the regularity of the dots in the circle of coin 1, we think that the first Sidonian die engravers used pearl-shaped punches;[18] but is difficult to say whether other punches were used, for example for the hull or the triangular rigging of 1, which is not easy to explain and will be discussed further.

The style of these first coins is as fine as that of the first issues of the other Phoenician coinages. The regularity of the circle of dots on coin 1 seems to indicate that the Sidonian engravers prepared the surface of the die for this coin before engraving, by drawing a circle with a compass. We notice the delicacy of the details and the combination of realistic and conventional representations which characterize the Sidonian numismatic style up to the time of Alexander: for example, all the details of the prow are represented, while the oars are not.

The representation on the obverse has usually been identified as a war galley with a triangular sail. Now an accurate study of all the coins of series A and especially of 4 and 5, two well-preserved coins hitherto unpublished, leads us to propose another explanation of this triangular design. The triangular sail is one of the most used in antiquity;[19] but this so-called latin sail had its tip turned upwards and not downwards as in the present case. In our opinion, the triangular design of series A does not represent an unfurled triangular sail, but a furled one with rigging: as a matter of fact, if we closely observe the details engraved in the triangular surface (very clear on coins 4 and 5), we see that the mast crosses the triangular surface, that oblique lines connect it to the yard, and that the yard does not form a line, but a kind of pad. The

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[18] See J. Elayi, "Remarques méthodologiques sur l'étude paléographique des légendes monétaires phéniciennes," in *Phoinikeia Grammata, IX' Colloque international du Groupe de contact interuniversitaire d'études phéniciennes et puniques* (Liège, 1989), to be published in *Studia Phoenicia*.

[19] L. Casson, "The Sails of the Ancient Mariners," *Archaeology* 7 (1954), pp. 214–19; J. Rougé, *La marine dans l'Antiquité* (Paris, 1975), p. 59.

Phoenician war galleys on Assyrian reliefs of Sennacherib's palace in Nineveh (Plate 2, 9), dated from the beginning of the seventh century,[20] depict a totally furled sail with brails and halyards. On the coin, the bunched sail is hardly visible on the yard, and the triangular lines represent brails, tightened and fastened to the mast in several places. Only two lines, on both sides of the mast, are represented on the reliefs. Depending on the size of the coin seem to be represented. The halyards (two, three, or four braïls) represented on the Assyrian reliefs are not clearly visible here, but may be in the obscure design on both sides of the triangular surface on coin 1 (and may be represented on the coin illustrated on Plate 1, 7). When the sail is totally furled, the brails are usually gathered and fastened at one place close to the mast,[21] but they are sometimes fastened to the mast, at one place[22] or several places as is the case here and on Assyrian reliefs.[23]

The method of producing the die for coin 1 is not clear. It seems that instead of engraving the whole mast and the brails on the same level on the die, the engraver engraved them inside a triangular hollow. Is it possible that he used a triangular punch and after that engraved the triangular hollow impressed in the die? It is because of some such process that it has been previously concluded that there was a triangular sail on the galley. Coins 4 and 5, with the clearly engraved repre-

[20] A. H. Layard, *The Monuments of Nineveh* (London, 1853), pl. 71; also L. Casson, *Ships and Seamanship in the Ancient World* (Princeton, 1973), fig. 79, relief from Karatepe ca. 700 B.C.). On the Phoenician trireme, L. Basch, "Phoenician Oared Ships," *The Mariner's Mirror* 55 (1969), pp. 139–62, 227-45; Casson, pp. 94–96; M. C. de Graeve, *The Ships of the Ancient Near East* (c. 2000–500 B.C.) (Louvain, 1981), pp. 169–71.

[21] Casson (above, n. 20), fig. 61, relief on a temple at Medinet Habu, ca. 1190 B.C.; Rougé (above, n. 19), p. 61, fig. 12.

[22] E. F. Schmidt, *Persepolis II, Contents of the Treasury and Other Discoveries* (Chicago, 1957), p. 30, pl. 9; cf. de Graeve (above, n. 20), pp. 74–75 and pl. 46, figs. 106–7. These war galleys are on two seal impressions from Persepolis (one of them dated from the reign of Xerxes) and might be Phoenician. There are traces of brails fixed on the mast: two on fig. 106 and one on fig. 107. See also Casson (above, n. 20), fig. 134, illustration in a manuscript of Ioannes Scylitzes in the Bibliotheca Nacional of Madrid, fourteenth century A.D. The model of a trireme in Armant, possibly Phoenician, is represented without sail (De Graeve [above, n. 20], pl. 55, fig. 135).

[23] See above, n. 20.

sentation of brails fastened to the mast, without a triangular relief, show that the old interpretation has to be abandoned. In both series A and B, there are no lifts above the yard,[24] which were used in Egyptian galleys from the Middle Empire onward, but were missing in the first Greek galleys.[25]

The hull is reinforced by two lines of wales (coin 1);[26] there is a row of portholes separated by stanchions[27] and, along the bulwark, a line of shields, apparently worn away on coin 1 but clearly visible on 4 and 5 (at least six to eight shields). The prow ends with an *embolon*, very long as is the case for all Phoenician galleys (here maybe one quarter of the total length) and with one prong as is the case for the galleys of the following series. The line of shields finishes at the end of the prow, and there is an eye, smaller than the huge eye of Aradian galleys,[28] at the same level as the line. The lower horn could be interpreted as a *pro-embolon* ending a wale; the upper one seems to be a more or less projecting *stolos* (clearly visible on coin 4). The design represented above the prow is probably the figurehead: two short vertical strokes ending with a dot and possibly connected by a long horizontal stroke. The design is too stylized and isolated to allow any interpretation. The poop, partly or completely off the flan on these coins, seems to end with an *aphlaston*;[29] the *stylis*, if any, is located off the flan; the horizontal stroke which can be seen on coins 2 and 4 is possibly the tiller of the rudder which appears aft, under the hull.[30]

The type of this galley cannot be completely identified. The lack of oars, in particular, prevents us from recognizing a trireme, which is clearly depicted on the coins of series D onwards,[31] or a bireme as repre-

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[24] On the representation of the crow's nest, see Rougé (above, n. 21), p. 61, fig. 12. The crow's nest can be seen more clearly on the following series, see e.g. *Numismatic and Fine Arts* 16, 2 Dec. 1985, 266.

[25] Rougé (above, n. 21), p. 62.

[26] For the wales, see Basch (above, n. 20), p. 156; J. Elayi and A. G. Elayi, "A Treasure of Coins from Arwad," *JANES* 18 (1986), p. 8.

[27] They cannot be seen on coin 1.

[28] Elayi and Elayi (above, n. 26), p. 8 and n. 17.

[29] Elayi and Elayi (above, n. 26), p. 9 and n. 22.

[30] For example *SNGCop*, pl. 5, 188; see also J. Thurneyssen, "Le gouvernail antique," *DoAr* 29 (1978), pp. 74–80.

[31] Elayi (above, n. 2), pp. 212–13.

sented on the Assyrian reliefs. The number of shields, eight, is low in
contrast to some coins of the following series (up to 18 on the double
shekels). It may be that the size of the coin limits the number of shields
which could be depicted and therefore we cannot estimate the exact size
of the galley. However, the engraver's care for accuracy allows us to
make some remarks. The connection with the galleys represented on
Assyrian reliefs seems obvious as far as the way of furling the sail and
fastening the brails are concerned, but the ornaments of the prow and
poop are different, as also is the freeboard. The connection with the
galleys of series B (Plates 1, 7, and 2, 8) is even more obvious as far as
the whole representation is concerned as we think that series A repre-
sents a totally furled sail, while series B represents the same kind of sail,
half furled, as is indicated from the width of the pad and the hanging
and separated slack free brails.[32] In so far as the representation is
accurate, the regular width of the pad seems to indicate that the shape
of the sail was square or rectangular; if it had been triangular, the
central part of the pad would have been more bulky than its tips.

This series A offers an important testimony on the typology of the
first known representations of Sidonian galleys during the Persian
period, with a proven connection with the representations of Assyrian
reliefs. This series also informs us that the symbols chosen for the first
coins—the galleys, the archer, the corbiesteps, and the eye—are all
military symbols expressing the power and the protection of the city.[33]
We can also describe the style of a Sidonian monetary workshop with its
repetitious designs, its borrowings from Persian art, its mixture of
realism and stylization, and the original representation of architectural
designs. One does wish that the publication of this study will bring to
light other coins of this series and enrich it with new information.[34]

[32] See an example of this representation in Casson (above, n. 20), fig. 151 (relief on
the tomb of Naevolia Tyche at Pompei).

[33] In contrast, the city of Byblos did not have military symbols in its first series,
probably because there was no naval force there at that time, see J. Elayi, "Les
symboles de la puissance militaire sur les monnaies de Byblos," RN 26 (1984),
pp. 140–47.

[34] We know, for example, that there were nine examples of this type (here, group
2) in the hoard of Qasr Naba mentioned by J. Rouvier ("Les rois phéniciens de Sidon,
d'après leurs monnaies, sous la dynastie des Achéménides," RN 1902, pp. 258-59);
unfortunately, we lack illustrations, precise descriptions, and present locations for
these coins.

KEY TO PLATES

1. Sidonian half shekel. 6.35 g. ↑. Kunst Historisches Museum, Vienna (× 3).
2. Small denomination. 0.61 g. ↖. American Numismatic Society, New York (× 3).
3. Small denomination. 0.54 g. ↖. Cabinet des Médailles, Paris (× 3).
4. Small denomination. 0.45 g. ↑. Private coll., Paris (× 3).
5. Small denomination. 0.31 g. ↑. A. Spaer, Jerusalem (× 3).
6. Small denomination. 0.16 g. Cabinet des Médailles, Paris (× 3).
7. Staatliche Museen zu Berlin, 3. 6.96 g. ↑ (× 3).
8. Cabinet des Médailles, Paris, HS 1973.1.276. 7.02 g. ↑ (× 4).
9. Rigging of a Phoenician galley on an Assyrian relief (A. H. Layard, *The Monuments of Nineveh* [London, 1853], pl. 71).

ATHENIAN NEW STYLE TETRADRACHMS
IN MACEDONIAN HOARDS

F. de Callataÿ

Several hoards found in Macedonia contained New Style tetradrachms from Athens. The composition of these hoards has a distinctive profile. This profile has implications about the circulation of silver coinage in ancient Macedonia.[1]

I. Touratsoglou recently observed that in many cases Athenian coins were hoarded separately in Macedonia.[2] In his inventory, there are seven hoards composed only of Athenian coins and six which contain other currencies as well.[3] Dating the hoards on the lower chronology, he observes that "the numerous Athenian issues they contain fit into the period 139 B.C. until about 92 B.C., according to Mørkholm."[4] During that period Macedonia had to defend itself against several incursions,

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[1] It is a pleasure to thank the late Miss M. Thompson and Mr. G. Le Rider and Mr. I. Touratsoglou for their comments on a draft of this paper. F. de Callataÿ is curator of ancient coins at the Brussels cabinet.

[2] I. Touratsoglou, "The Adam Zagliveriou/1983 Hoard in the Museum of Thessaloniki (Athenian 'New Style') Tetradrachms in Macedonia" Νομισματικά Χρονικά 8 (1989), p. 17 (hereafter, Touratsoglou).

[3] Touratsoglou, p. 20, nn. 1 and 2.

[4] Touratsoglou, p. 18. In 1961, Margaret Thompson published her monumental work, *The New Style Silver Coinage of Athens*, ANSNS 10 (New York, 1961). The chronology, particularly the end of the sequence, of this standard reference has been criticized by several people who proposed a down dating of ca. 32 years. For this, see O. Mørkholm, "The Chronology of the New Style Coinage of Athens," *ANSMN* 29 (1984), pp. 29-42.

first from the Scordisces and then from Thracian tribes. This troubled period, which ends with the arrival of Mithridatic troops at the beginning of the 80s, fits well according to Touratsoglou with the importation of large quantities of Athenian coins, particularly when we take into account the provincialization of Macedonia and the disruption of mining activity.[5]

This overall view is straightforward and coherent. But a question remains concerning the timing of the entry of Athenian coinage into Macedonia. Did the arrival of this money coincide with the invasions?[6] Or was it the result of a single, massive supply at a certain moment?

This study of Athenian emissions documented in Macedonian hoards allows us to resolve the question. As a matter of fact, we notice strong and recurrent abnormalities between the representation of the emissions in Macedonian hoards and what we know about the rhythm of Athenian production.

The following chart analyzes the content of Macedonian hoards containing New Style coinage. For convenience, I take up dates given by Margaret Thompson in 1961 (Mørkholm's dates, see n. 4, lower these dates by about 32 years).[7] The second column is devoted to the names of the two main magistrates and the third to the varieties listed by

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[5] Touratsoglou (p. 18) slightly adapts an idea expressed by Otto Mørkholm who observed that the increased production of silver coin in Athens about 145/4 was partly a result of political changes imposed by Rome which resulted in the interruption of some important silver coinages, see O. Mørkholm (above, n. 4), p. 42.

[6] Touratsoglou (p. 18) wrote: "The examination of the hoards in combination with the information from historical sources seems to favour the chronological classification of the Athenian issues as suggested by Mørkholm and to justify the view that the inflow of 'wreathbearing silver' into Macedonia occurred during periods of upheaval and threat from abroad: the clashes of the Roman legions in 135 B.C., 119 B.C.; 114 B.C. and 106 B.C. with the Scordisci Gauls are reflected in the hoards of Thessaloniki/1929, Veria/1962, Kilkis/1961, Macedonia(?)/1958, Serres/1913 and Chalkidiki/1976, while the situation caused by the raids of the Thracians and the invasion of the army of Mithridates are shown by the hoards of Pella/1984, Stovi/1971, Katerini/1928, Zarova, Thessaloniki/1898 (events of the years 92 B.C., 89–5 B.C., 84 B.C., 77/6 B.C.)."

[7] In addition to the Mørkholm down dating, the sequence of some emissions needs to be changed. Until this is done it seems preferable not to give the illusion of perfect accuracy, but to let the Thompson dates stand even through they are over three decades too high and need some internal rearrangement.

Thompson.[8] Next, for each emission, the number of obverse dies in the Thompson's corpus is followed by the number of specimens. Then, after these different general parameters, the number of Athenian specimens attested in six different hoards is listed. Five of them are properly Macedonian: *IGCH* 478 (Thessalonica, ca 1929), *CH* 4, 66 (Chalcidice, 1976), *CH* 7, 133 (southwestern Macedonia, 1981),[9] Adam Zagliveriou (1983), and *IGCH* 524 (Zarova, 1898). The sixth hoard is the northernmost and was unearthed some 70 km. south of Sofia, *IGCH* 976 (Belica, 1956).

Table 1

Athenian "New Style" Tetradrachms in Macedonian Hoards

Magistrates	Varieties	Obv. Dies	Spec.	IGCH 478	CH 4, 66	CH 7, 133	Adam	IGCH 524	IGCH 976
Early Period									
171/0 KTHΣI-EYMA	266–286	21	102	–	--	–	–	–	–
170/69 ΓΛΑΥ-EXE	287–306	20	77	10	–	---	–	–	–
169/8 MIKI-ΘΕΟΦΟΡΑ	315–324	10	68	15	–	–	–	–	–
Middle Period									
168/7 HPA-APIΣTOΦ	324–340	12	84	13	–	–	–	–	–
167/6 MENEΔ-EΠΙΓΕΝΟ	347–355	9	101	27	–	–	–	–	–
166/5 TIMAPXOY-NIKAΓO	360–368	9	66	13	–	–	–	2	–
165/4 ΠΟΛΥΧΑΡΜ-NIKOΓ	368–380	6	49	3	–	–	–	+	–
164/3 ΔΩΡΟΘΕ-ΔΙΟΦ	383–390	8	53	–	–	–	–	–	–
163/2 ANTIOXOΣ-NIKOΓ	396–401	6	54	–	–	–	1	–	–
162/1 ΘΕΟΦΡΑ-ΣΩΤΑΣ	401–410	8	44	–	1	–	–	–	1
161/0 ΔΙΟΓΕ-ΠΟΣΕΙ	413–418	7	43	–	–	–	–	1	–
160/59 ΑΧΑΙΟΣ-ΗΛΙ	421–427	8	79	–	–	–	1	+1	–
159/8 ΛΥΣΑΝ-ΓΛΑΥΚΟΣ	429–439	11	91	–	–	1	–	+5	–
158/7 ΕΠΙΓΕΝΗ-ΣΩΣΑΝΔΡΟΣ	441–458	18	244	–	7	2	8	+78	7
157/6 ΠΟΛΕΜΩΝ-ΑΛΚΕΤΗΣ	461–472	12	182	–	4	4	–	+55	5
156/5 MIKIΩN-EYPYKΛEI	475–490	16	196	–	4	1	5	+64	2
155/4 ΑΦΡΟΔΙΣΙ-ΑΠΟΛΗΞΙ	494–503	11	44	–	–	–	–	1	–
154/3 EYPYKΛEI-APIAPA	503–522	16	83	–	2	–	–	3	–
153/2 ΚΑΡΑΙΧ-ΕΡΓΟΚΛΕ	524–541	18	159	–	3	2	7	+37	1
152/1 ΑΦΡΟΔΙΣΙ-ΔΙΟΓΕ	543–554	12	101	–	–	–	2	+6	–

[8] Some publications (as *CH* 4, 66) do not mention years on magistrates' names, but refer to the Thompson numbers only.

[9] See A. Burnett, "Aesillas: Two New Hoards," *CH* 7 (London, 1985), pp. 54–67.

Magistrates	Varieties	Obv. Dies	Spec.	IGCH 478	CH 4, 66	CH 7, 133	Adam	IGCH 524	IGCH 976
151/0 ΔΙΟΝΥΣΙ-ΔΙΟΝΥΣΙ	552–577	25	175	–	–	–	1	+9	–
150/49 ΑΜΜΩΝΙΟΣ-ΚΑΛΛΙΑΣ	577–593	15	136	–	–	–	–	5	–
149/8 ΘΕΜΙΣΤΟ-ΘΕΟΠΟΜΠΟΣ	596–609	14	110	–	–	–	–	+4	–
148/7 ΣΩΚΡΑΤΗΣ-ΔΙΟΝΥΣΟΔΩ	611–625	15	121	–	–	–	–	8	–
147/6 ΜΗΤΡΟΔΩΡΟΣ-ΜΙΛΤΙΑΔΗΣ	629–644	16	115	–	–	–	1	+4	–
146/5 ΔΙΟΤΙΜΟΣ-ΜΑΓΑΣ	648–664	17	98	–	–	–	2	+3	–
145/4 ΕΥΜΑΡΕΙΔΗΣ-ΑΛΚΙΔΑΜ	669–684	16	111	–	–	–	1	3	–
144/3 ΧΑΡΙΝΑΥΤΗS-ΑΡΙΣΤΕΑΣ	686–695	10	129	–	2	–	–	+8	–
143/2 ΦΑΝΟΚΛΗΣ-ΑΠΟΛΛΩΝΙΟΣ	697–709	13	120	–	2	–	–	+9	–
142/1 ΕΥΒΟΥΛΙΔΗΣ-ΑΓΑΘΟΚΛΗ	710–721	13	94	–	–	–	2	+6	–
141/0 ΔΑΜΙΩΝ-ΣΩΣΙΚΡΑΤΗΣ	719–732	12	122	–	1	–	1	+9	–
140/39 ΕΥΜΗΛΟΣ-ΚΑΛΛΙΦΩΝ	729–746	16	102	–	–	–	–	+3	–
139/8 ΗΡΑΚΛΕΙΔΗΣ-ΕΥΚΛΗΣ	745–757	10	69	–	–	–	–	+6	–
138/7 ΘΕΟΔΟΤΟΣ-ΚΛΕΟΦΑΝΗΣ	759–775	17	147	–	–	4	2	22	
137/6 ΗΡΑΚΛΕΙΔΗΣ-ΕΥΚΛΗΣ	777–798	22	145	–	–	1	–	–	–
136/5 ΑΝΔΡΕΑΣ-ΧΑΡΙΝΑΥΤΗΣ	795–809	12	70	–	–	–	–	+8	–
135/4 ΙΚΕΣΙΟΣ-ΑΣΚΛΗΠΙΑΔΗΣ	812–821	11	67		–	–	1	5	–
134/3 ΤΙΜΟΣΡΑΤΟΣ-ΠΟΣΗΣ	823–835	14	82	–	–	–	–	+9	–
133/2 ΑΜΦΙΚΡΑΤΗΣ-ΕΡΙΣΤΡΑΤΟΣ	833–851	15	71	–		–	–	+8	–
132/1 ΔΩΣΙΘΕΟΣ-ΧΑΡΙΑΣ	847–876	29	109	–	–	–	1	+9	–

Late Period

131/0 ΔΗΜΗΤΡΙΟΣ-ΑΓΑΘΙΠΠΟΣ	879–925	47	195	–	–	–	1	+15	–
130/29 ΝΙΚΗΤΗΣ-ΔΙΟΝΥΣΙΟΣ	929–961	33	148	–	–	–	–	+7	–
129/8 ΑΡΙΣΤΙΩΝ-ΦΙΛΩΝ	959–989	30	118	–	–		–	3	
128/7 ΑΡΟΠΟΣ-ΜΝΑΣΑΓΟ	990–1014	25	112	–	–	–	1	+3	–
127/6 ΞΕΝΟΚΛΗΣ-ΑΡΜΟΞΕΝΟΣ	1014–1031	19	59	–	–	–	–	2	–
126/5 ΝΙΚΟΓΕΝΗΣ-ΚΑΛΛΙΜΑΧΟΣ	1032–1048	17	43	–	–	–	–	–	–
125/4 ΔΗΜΕΑΣ-ΕΡΜΟΚΛΗΣ	1050–1066	17	89	–	–	–	–	–	–
124/3 ΞΕΝΟΚΛΗΣ-ΑΡΜΟΞΕΝΟΣ	1066–1105	42	121	–	–	–	–	–	–
123/2 ΞΕΝΟΚΛΗΣ-ΑΡΜΟΞΕΝΟΣ	1110–1123	14	40	–	–	–	–		–
122/1 ΚΟΙΝΤΟΣ-ΚΛΕΑΣ	1122–1129	7	23	–	–	–	–	–	1
121/0 ΑΠΕΛΛΙΚΩΝ-ΓΟΡΓΙΑΣ	1131–1142	12	85	–	–		–	–	–
c. 121 Β. ΜΙΘΡΑΔΑΤΗΣ-ΑΡΙΣΤΙΩΝ	1143–1145	3	6	–	–	–	–	–	–
120/19 ΜΝΑΣΕΑΣ-ΝΕΣΤΩΡ	1147–1156	10	25	–	–	–	–	–	–
119/8 ΚΛΕΟΦΑΝΗΣ-ΕΠΙΘΕΤΗΣ	1158–1164	7	20	–	–	–	–	–	–
118/7 ΜΕΝΤΩΡ-ΜΟΣΧΙΩΝ	1165–1172	8	24	–	–	–	–	–	–
117/6 ΑΡΧΙΤΙΜΟΣ-ΔΗΜΗΤΡΙ	1169–1178	7	19	–	–	–	–	–	1
LUCULLIAN				–	–	–	–	–	1

The first hoard (IGCH 478, Thessalonica) is different from all the others. It contains 81 tetradrachms which are all dated between 170/69 and 165/4 according to Thompson, that is to say between ± 138/7 and 133/2 following the low chronology. The excellent state of preservation of the coins[10] and the number of die links strongly argue for a burial date at the end of 130s, very soon after the arrival of these tetradrachms in Macedonia.

The five other hoards were deposited some 20 to 50 years later, between ± 110 and 80 B.C.[11] These five hoards are composed similarly. Indeed, four emissions are strangely overrepresented in each of these hoards, those with the names of ΕΠΙΓΕΝΗ-ΣΩΣΑΝΔΡΟΣ, ΠΟΛΕΜΩΝ-ΑΛΚΕΤΗΣ, ΜΙΚΙΩΝ-ΕΥΡΥΚΛΕΙ, and ΚΑΡΑΙΧ-ΕΡΓΟΚΛΕ. In each of the five hoards, these four emissions constitute more than half of the specimens.

Table 2

The Four Overrepresented Emissions

	Number	Total	Percentage
CH 4, 66	18	26	69.2
CH 7, 133	9	15	60.0
Adam Zagliveriou	20	38	52.6
IGCH 524	234	421	55.6
IGCH 976	15	19	78.9

This situation contrasts highly with the real significance of these four emissions in Athenian tetradrachm production.[12] Examining the fourth

[10] Thompson, p. 475: "The coins recorded above are all well preserved, those of the first three strikings somewhat more worn than those of the last, many of which are FDC."

[11] Indeed, if we down-date Thompson by 32 years the terminus post quem for each of the five hoards is: Chalcidice, CH 4, 66, 109/8; southwestern Macedonia, CH 7, 133, 105/4; Adam Zagliveriou, 96/5; Zarova, IGCH 524, 95/4; and Belica, IGCH 976, 85/4.

[12] Some hoards from northern Greece are not detailed here because they are either too modest or unpublished. Nonetheless, when information is available, the results attest the same phenomenon. Strojno 1961, IGCH 924, had four Athenian specimens with two ΕΠΙΓΕΝΗ-ΣΩΣΑΝΔΡΟΣ and one ΜΙΚΙΩΝ-ΕΥΡΥΚΛΕΙ, see E. Schoenert-Geiss,

column of Table 1, the number of obverse dies reported by Thompson, the disposition is obvious. With an average of 16 obverse dies each year (18, 12, 16, and 18), these four emissions are certainly well represented.[13] However, they are not different from the neighboring emissions. Many of these are of a similar volume (even larger from time to time), but are poorly documented in Macedonian hoards, while the four emissions above take a trifling place in hoards from Crete, Delos, Attica, Euboea, and Thessaly. The detailed account, based on Thompson's publication, is in Table 3.

<div align="center">

TABLE 3

The Four Overrepresented Specimens in Other Hoards

</div>

Crete	Number	Total	Percentage
Cretan Hoard 2, *IGCH* 332	1	63	1.6
Cretan Hoard 1, *IGCH* 331	0	13	0.0
Hieraptytna, *IGCH* 352	0	27	0.0
Total	1	103	1.0
Delos			
Delos Γ, *IGCH* 284	2	249	0.8
Delos KC, *IGCH* 290	3	19	15.8

Griechisches Münzwerk. Die Münzpragung von Maroneia (Berlin, 1987), pp. 105–6; Benkovski 1933/4, *IGCH* 917, had one Athenian specimen with MIKIΩN-EYPYKΛEI, see Thompson, p. 523, and E. Schoenert-Geiss, p. 96; Levka 1974, *CH* 1, 92 = *CH* 6, 49, had one Athenian specimen EΠIΓENH-ΣΩΣANΔPOΣ, see E. Schoenert-Geiss, p. 101. Further, one of the four emissions attested for the Simitlii hoard is, once again, EΠIΓENH-ΣΩΣANΔPOΣ, see Thompson, p. 522. Finally, the only Athenian tetradrachm unearthed in Dacia is ΠOΛEMΩN-AΛKETHΣ, see B. Mitrea, "Un tétradrachme athénien du nouveau style découvert en Dacie," *Essays Thompson* (Wetteren, 1979), pp. 197–201, pl. 18. This article was still in press when Dr. I. Propopov sent me one of his latest publications, "A Hoard of Athens and Thasos Tetradrachms Discovered near the Town Raslog," *News of the Historical Museum of Kjustendil* (1989), pp. 249–68 (in Bulgarian, summaries in French and English). Of the 18 Athenian tetradrachms, 8 have EΠIΓENH-ΣΩΣANΔPOΣ, 5 have ΠOΛEMΩN-AΛKETHΣ, 4 have MIKIΩN-EYPYKΛEI and 1 has KAPAIX-EPΓOKΛE. Thus, in this case, all the specimens belong to the four overrepresented emissions.

[13] Logically, these emissions are documented by a high number of specimens. It goes without saying that this situation results in large part from Macedonian hoards.

Delos ΛΗ *IGCH* 285	0	248	0.0
Delos Β *IGCH* 286	7	52	13.5
Delos ΞΘ *IGCH* 297	0	52	0.0
Delos Α *IGCH* 347	0	11	0.0
Total	12	631	1.9
Euboea			
Carystos 2, *IGCH* 291	0	41	0.0
Carystos 1, *IGCH* 344	0	70	0.0
Total	0	121	0.0
Attica			
Piraeus, *IGCH* 337	1	12	8.3
Diplyon, *IGCH* 339	0	33	0.0
Total	1	45	2.2
Thessaly			
Halmyros, *IGCH* 289	13	903	1.4

These results are obvious: completely absent from many hoards outside Macedonia, the four emissions constitute less than 16 percent in one case and usually less than 2 percent. Thus, it seems evident that we are dealing with a separate Macedonian circulation phenomenon.

This pecularity is so glaring that it is now possible, I think, to identify the uncertain provenance of *IGCH* 296 = *CH* 7, 130 (Toronto, 1928). According to the data provided by Thompson, the three emissions most documented in this hoard are ΠΟΛΕΜΩΝ-ΑΛΚΕΤΗΣ, 6 specimens; ΜΙΚΙΩΝ-ΕΥΡΥΚΛΕΙ, 9 specimens; and ΚΑΡΑΙΧ-ΕΡΓΟΚΛΕ, 7 specimens. If the ΕΠΙΓΕΝΗ-ΣΩΣΑΝΔΡΟΣ emission is apparently absent, the 3 other ones nonetheless represent 45.8 percent of the total, 22 coins out of 48.[14] The remaining 26 coins belong to 14 different emissions dated over a period of some 50 years. This unbalanced distribution constitutes a solid argument for putting this hoard—or, at least, this part of the hoard—in northern Greece, in Macedonia or Thrace.[15]

[14] Thompson, p. 501, and *IGCH* 296 mention a total of 48 Athenian tetradrachms. In *CH* 7, 130, one specimen is added to the total and one variety (Th. 804a) is removed—a somewhat puzzling process.

[15] Thompson, p. 502: "The Ontario lot seems rather to be a section of a larger hoard. In the absence of information as to its provenance and the date of its acquisition, speculation is perhaps useless." Hypotheses that link this material with Carystos hoard 1 (Thompson) or Halmyros hoard (*IGCH* 289 and 296) remain speculative.

The four overrepresented emissions have two interesting charac-
teristics. First, they are not the most recent emissions in Macedonian
hoards. Second, they are nearly sequential. Indeed three out of four
emissions are sequential, from 158/7 to 156/5). The fourth one, 153/2
comes quickly after them following a gap of two years—155/4 and
154/3. Is it possible that the **KAPAIX-EPΓOKΛE** emission of year 153/2
directly followed the other three? No die linkage evidence contradicts
this hypothesis.[16] Neither do the study of style nor the study of hoards
contradict it. The important point is to see that the main import of
Athenian tetradrachms happened very massively in a short space of
time (whether 4 or 6 years). As Thompson wrote very subtly in her
commentary on the Zarova hoard, "It is true that one would expect a
preponderance of coinage from late issues in a currency hoard but it
must be remembered that we are concerned here not with the Athens
area but with an outlying district. The appearance of so many tetra-
drachms of 158–153 B.C. may simply reflect large-scale movement of
Athenian coins to the north during those years and their continued use
over a long period. Later strikings may have travelled to Macedonia in
smaller quantity."[17]

This massive import of Athenian currency into Macedonia can be
dated from about 158/7 to 153/2 according to the high chronology, that
is to say from about ± 126/5 to about ± 121/0 according to the more
likely low chronology. This period from about 126/5 to 121/0 attracts
attention. A gap of some twenty years exists between the provincial-
izing of Macedonia (and the closing of the mints which is generally
linked with this event) and the flood of Athenian tetradrachms which
occurred to supply the deficiencies of local production. Recalling
Tourastoglou's comments on these two events, there are two possibil-
ities. 1. After the closing of the Macedonian mints, enough coinage was
available for the needs of the next 20 years. 2. The great reorganization
of monetary production by the Romans did not take place in ± 146 but
many years later.

The resolution of these propositions is difficult. However, it is
important to realize that the second suggestion—which may be more

[16] Interestingly, the emissions dated by M. Thompson to intervening years 155/4
and 154/3 are linked by obverse dies.

[17] Thompson, p. 490, n. 1, also pp. 539–40.

difficult to defend—does not conflict with any other evidence particularly if we are prepared to accept a certain distance between political and monetary affairs. Without taking a position in favor of one idea rather than the other, I would like to submit the two following thoughts. 1. If this quantity of money arrived in Macedonia around 120 as a result of a decision taken some 20 years earlier, we would expect to have more examples of the intevening issues of Athenian tetradrachms. Therefore, everything seems to indicate that this phenomenon was not a progressive one, with increasing importation of coins in tiered fashion, but a massive and very sudden one.[18] 2. Several numismatists have linked the beginning of the large tetradrachm production in Thasos and Maronea with the provincializing of Macedonia in 146. Now, it may be, according to recent research, that the Maronean coinage was not initiated before the last quarter of the second century.[19] In this case—but prudence is clearly required—it may well be that the large monetary changes affecting Macedonia in the last half of the second century (suspension of monetary activity in Macedonia, import of Athenian currency, and the beginning of intensive production at Thasos and Maronea) happened about 125 B.C., that is to say two decades after the most commonly believed dates. This last suggestion needs further investigation and review.

These emissions which reached northern Greece in a seemingly very abrupt manner continued for some thirty years to provide the bulk of the coinage used in local exchanges. Their longevity in Macedonia is accompanied by their general absence in hoards deposited south of Macedonia. This compartmentalization does not support an often made assumption about the use of Athenian tetradrachms for large international exchanges (trade or mercenary pay). On the contrary, this observation argues for a rather immobilized circulation, supplying the needs of a local market. Thompson was once again very circumspect when she wrote that the composition of the Zarova hoard seems "to point up what is an entirely reasonable premise but one that is perhaps

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[18] Such a massive importation seems more likely to have been carried out by an organized central state than by a series of individual transactions.

[19] F. De Callataÿ, "Un tétradrachme de Mithridate surfrappé à Maronée," *NumAnt Class* 20 (1991), pp. 213-26."

sometimes forgotten, namely that coinage did not flow in and out of any given region in a steady stream but rather in irregular waves as dictated by the exigencies of commerce, politics, military operations and other circumstances and that the hoards inevitably reflect this erratic monetary pattern."[20] So, the case of the Athenian tetradrachms in Macedonian hoards serves as warning: monetary circulation is not always an even flow expanding ever outward. The hoard evidence here seems to indicate that at times circulation is subject to severe constraints.

[20] Thompson, p. 540.

ASANDER OF THE BOSPORUS:
HIS COINAGE AND CHRONOLOGY

(PLATES 3–4)   KRZYSZTOF NAWOTKA

A wave of interest in the Bosporus has resulted in recent years in five major works on the numismatics of that area. One is a detailed study of the coinage of Chersonesus,[1] while three others concern themselves strictly with the Bosporus, covering respectively to the end of second century B.C.,[2] A.D. 69 to 238,[3] and 242 to 341/2.[4] The most recent work by V. A. Anokhin[5] is an ambitious attempt to deal with all the numismatics of the Bosporan kingdom in one volume. In a work of such wide scope it was impossible for the author to study in detail the years 107 B.C. to A.D. 68, a turbulent period of Bosporan history not covered by the earlier monographs of Frolova and Shelov. The coinage of King Asander, reigning sometime in the second half of the first century B.C., is therefore worth a more careful examination.

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[1] V. A. Anokhin, *The Coinage of Chersonesus, IV Century B.C. – XII Century A.D.*, BAR 69 (1980).

[2] D. B. Shelow, *Coinage of the Bosporus VI–II Centuries B.C.*, BAR 46 (1978), hereafter Shelov.

[3] N. A. Frolova, *The Coinage of the Kingdom of Bosporus A.D. 69–238*, BAR 56 (1979).

[4] F. A. Frolova, *The Coinage of the Kingdom of Bosporus 242–341/342*, BAR 166 (1983).

[5] V. A. Anokhin, *Monetnoe delo Bospora* (1986), hereafter Anokhin.

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Asander minted gold and bronze coins; no silver pieces are known.[6] Asander's staters are all dated which makes them much more useful for chronology than the bronze coins, which generally are undated. Bosporan coins prior to the beginning of the first century B.C. were undated. Afterward two methods of dating were applied. Pharnaces (63–47 B.C.) had dates according to Bosporan era[7] inscribed on his coins[8] as did his daughter Dynamis and most of her successors up to A.D. 4. Unfortunately Asander and probably Polemo I were exceptions and dated their staters according to their regnal years.[9]

The obverse type of Asander's staters consists always of a beardless male head right, never accompanied by an inscription or attribute. Nike on the ship's prow is the reverse type. There is always an

[6] The only known silver tetradrachm of Asander (Florange, 16 Oct. 1923, Mr. X, 32) is a modern counterfeit. Such a denomination was extremely rare in the Bosporus (Anokhin has only three examples: 117, 127 from third century B.C. Panticapaeum, and 161, a coin of Paerisades III). The coin in question is clearly in early Seleucid style. The obverse type consists of a male head right, the reverse shows Apollo seated on omphalos left, and neither type is attested in the Bosporus. On the reverse there is an inscription ΒΑΣΙΛΕΩ[Σ] ΑΣΑΝΔΡΟΥ. Paleographical reasons (a very broad Ω unattested on any other coin; Ρ with unusually short arm; all letters executed much more perfectly than Asander's die cutters normally did; despite a large space available, ΒΑΣΙΛΕΩΣ is inscribed in such a way as to lose purposely the last letter) also compel us to consider this coin as a fake. However in early numismatic literature rare silver coins of Asander are mentioned, see J. Eckhel, *Doctrina numorum veterum*, pt. 1, vol. 2 (1794), p. 368; D. Sestini, *Classes generales seu monete vetus urbium populorum et regum ordine geographico et chronologico descripta* (1831), p. 61. No sketches are given, but Eckhel's short description does not match the coin described above.

[7] About the era used in the Bosporus (in fact identical with the Pontic one) see *RE* 1, s.v. "Aera," cols. 635–36 (Kubitschek); W. H. Benett, "The Death of Sertorius and the Coin," *Historia* (1961), p. 461; E. Bikerman, *Chronology of the Ancient World* (1968), pp. 48–49; B. C. McGing, "The Kings of Pontus: Some Problems of Identity and Date," *Rheinisches Museum* 129 (1986), pp. 250–59. This era began in 297 B.C., each year lasted from autumn to autumn, probably starting in October as in the Macedonian calendar, see E. H. Minns, *Scythians and Greeks* (1913), pp. 590–91, hereafter Minns; G. Perl, "Zur Chronologie der Königreiche Bithynia, Pontos und Bosporos," *Studien zur Geschichte und Philosophie des Altertums* (1968), pp. 299–306.

[8] For the coinage of Pharnaces, see K. V. Golenko and K. J. Karyszkowski, "The Gold Coinage of King Pharnaces of the Bosporus," *NC* 1972, pp. 25–38.

[9] There is only one stater of Polemeo I preserved with letter A (Anokhin 255) which should indicate the first year of his rule.

inscription on the reverse: in years one to four it is ΑΡΧΟΝΤΟΣ ΑΣΑΝΔΡΟΥ ΒΟΣΠΟΡΟΥ and in years four to twenty-nine ΒΑΣΙΛΕΩΣ ΑΣΑΝΔΡΟΥ. The staters are dated: the first four issues with ΕΤ(ΟΥΣ) have **A**, **B**, **Γ**, or **Δ**; the succeeding issues have the alphabetic numeral by itself.[10] On coins issued in the first seven years, some additional letters and monograms appear in the exergue: **Aᴛ** on 1a and 3a, **Φ** on 1a and 1b, **M** on 6a and 7a. Possibly the monograms were the initials of mint officials.

Obverse 1 is for unkown reasons identified by some scholars with a portrait of Julius Caesar[11] or Octavian.[12] Any resemblance to their well-known images other than short hair can hardly be detected on the portrait inquestion. Such evidence seems insufficient to identify this portrait. An attempt to identify obverses 2 and 3 will be made below. The portrait on Asander's **ΒΑΣΙΛΕΥΣ** coins is commonly believed to be of the king himself. It should be stressed that profiles of the male head on these coins sometimes differ greatly from each other (for the most substantial differences compare 16, 21, and 23 with each other and with the rest of the coins). Asander died at the age of 93 (Lucian, *Macr.* 17) yet none of these obverses portrays a man of advanced years. A certain amount of idealization was clearly at work. A common feature appearing in all obverse basileus staters is Asander's long hair surrounded by a diadem. This royal hair style was first used by Pharnaces and cultivated by Asander and almost all of his successors until the end of the Bosporan coinage.[13]

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[10] Numbers from **A** to **ΘΚ** can only mean years, for some of them are preceded by ΕΤ(ΟΥΣ). The possibility that they could signify die numbers is excluded because different dies marked with the same letter are known.

[11] Chr. Giel, *Kleine Beiträge zur antiken Numismatik Südrusslands* (1886), pl. 2, 22; F. Burachkov, *Obschchyi katalog monet prinadlezchashchych ellinskimi koloniami sushchestvovavshymi v drevnosti na severnom beregu Chernovo Moria*, vol. 1 (1884), p. 47.

[12] R. Jameson, *Collection R. Jameson: Monnaies grecques antiques* (Paris, 1913), 2541, hereafter *Jameson*; E. S. G. Robinson, "Department of Coins and Medals," *BMQ* 15 (1941–58), pp. 49–50, pl. 19, 21.

[13] The long hair of the citizens of Olbia was commemorated by Dio Chrysostomus (36.17); perhaps at that time the hairstyle was common among northern Pontic Greeks.

There are 57 staters in the catalogue including 2 lead proofs. The results of a die study are presented in the Table.

TABLE

Year	Obv. Die	Rev. Die	No. of Coins	Die Comb.
1	1	a	1	1
2	1	b	1	2
3	2	a	2	3
4	3	a	1	4
	4	a	1	5
	5	a	2	6
6	6	a	1	7
7	7	a	1	8
8	8	a	1	9
9	9	a	3	10
10	10	a	2	11
	10	b	1	12
13	11	a	1	13
14	12	a	1	14
16	12	b	1	15
	13	a	1	16
	13	b	1	17
17	14	a	1	18
	15	a	1	19
18	13	c	1	20
20	13	d	1	21
	16	a	6	22
	17	a	1	23
21	18	a	3	24
	19	a	1	25
	20	a	2	26
	20	b	2	27
22	20	c	1	28
23	21	a	1	29
	22	a	3	30
	23	a	1	31
27	24	a	1	32
	24	a	2	33
	25	a	1	34
	26	a	2	35
28	27	a	1	36
29	28	a	1	37
	29	a	1	38

The coins per year ratio is only 1.97. In some years the number of preserved coins is as high as six (year 27) or even eight (years 20 and 21), while usually it is as low as one and for eight years there are no coins represented. Also the distribution of coins per die combination is very unequal: from six (die combination 22) to one (in 28 out of 38 die combinations). These factors ought to make us extremely cautious concerning any statistical conclusions. Hypothetical numbers of obverse dies, reverse dies, and die combinations are: 51 ± 7; 85 ± 14; and 99 ± 16.[14]

The information in the Table suggests that the minting of staters under Asander may have been quit erratic. Years such as 4, 20, 21, 23, and 27 for which there are three dies are mixed with years for which there are no coins 5, 11, 12, 15, 19, 24, and 26. In the early numismatic literature staters minted in years 12 and 25 are mentioned (unfortunately neither photographs nor even sketches of them were published), but only information about the stater from year 25 may be regarded as reliable enough not to doubt its very existence.[15] However incomplete the preserved gold coinage of Asander is, it seems that a definite pattern of minting coins can be traced. Quite often, for example, years of no coinage precede or follow those of multiple output, as year 5 follows year 4 (three obverse dies), year 15 precedes years 16 and 17 (two obverse dies each year), year 19 precedes year 20 (three obverse dies). Moreover, the years 24–26 with no coinage are sandwiched between two

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[14] G. F. Carter, "A Simplified Method for Calculating the Original Number of Dies from Die Link Statistics," *ANSMN* 28 (1983), pp. 195–204. Carter's method was based on a coinage with a large number of surviving issues. Given the small number of surviving Asander coins, it should be firmly stressed that the calculated numbers presented in this paper are at best conjectural.

[15] A stater from year 12 is mentioned by Sestini (above, n. 6), p. 61. Mionnet, *Suppl.* 4, p. 473, 40, cites a stater from year 25, which afterward was seen by the usually reliable A. von Sallet (*Beiträge zur Geschichte und Numismatik der Könige des Cimmerischen Bosporus und des Pontus von der Schlacht bei Zela bis zur Abdankung Polemo* 2 [1886], pp. 25 f) in Paris and by A. Bertier de la Garde (*Materialy dla vesovykh izsledovaniy monetarnykh sistem drevnegrechesikh gorodov i carey Sarmatii i Tavridy*, Numizmaticheski Svornik 2 [1913], n. 33) in the private Russian collection of I. A. Terlecki. The Paris coin is not in the Cabinet des Médailles (and perhaps never was there; von Sallet could have seen it in a private collection) but its existence ought not to be doubted.

periods of (for his period a considerable coinage: years 20–21, six obverse dies, and years 27–29, six obverse dies. It appears likely then that after a year or years of a large output (as year 4 or years 20–21) either the market became saturated or the resources of gold were exhausted thus making further minting either unnecessary or impossible. Alternately some intervals in minting (as in years 15 or 19) might have created a strong economic need for greater coinage in following years.

The sources of metal used in Asander's coinage remain largely unknown. No gold mines are attested for the Bosporus. In the later period subsidies from Rome may have been a source of gold, but they are confirmed only for the second half of the second century A.D. and later[16] and nothing suggests that any subsidy was delivered as early as the reign of Asander.[17] A possibility still exists that Asander had his staters minted from gold acquired from non-Roman sources, the closest to the Bosporus being the gold mines in Kolchis.[18]

King Asander apparently did not strike any silver coins nor did the cities of his kingdom, though they had done so previously up to approximately 80 B.C.[19] Zograph explains that this was due to the cutting of the supply of silver to the Bosporan market during the reign of Mithridates VI.[20]

[16] Lucian, *Alex.* 57; Zosimos 1.31.

[17] The most prolific years of Asander's gold coinage were 4 (41/40), 16 (29/28), 20 (25/24), 21 (24/23), 23 (22/21), and 27 (18/17). Gold could not have come from Rome in year 4 because at that time the triumvirs were themselves short of money and tried to exact it from client kings. In 29/28 B.C. Roman output was rather small; it might have been higher in 25–23 B.C. but only in Spanish mints. No gold coinage is confirmed for 22/21 B.C., although there was very high output in 18/17 B.C. Using the output of gold coins as an imperfect measure of the quantity of gold available, the theory of Roman subsidies seems unlikely.

[18] During Roman rule in Asia Minor, Kolchis and Armenia were the main sources of gold for that area, while ancient mines in Asia Minor and washings of Pactolus got exhausted and abandoned, T. S. Broughton, "Roman Asia," in *An Economic Survey of Ancient Rome*, ed. T. Frank (1938), p. 620.

[19] Panticapaeum: Anokhin 120–23, 127–29, 139, 160, 162–64, 167, 168, 172–74, 179–82, 186, 187, 187b, 189–89v, 190, 196, 198–200; Phanagoria: Anokhin 193, 204, 205, 205a, 206; Gorgippia: Anokhin 195, 197, 209.

[20] A. N. Zograph, *Ancient Coinage*, BAR 33 (1971), p. 302 (hereafter, Zograph).

The great majority of Asander's bronze coins were struck over previous city issus from the Bosporus, Pontus, and Paphlagonia.[21] All but one of his bronze issues were struck during the first four years of his reign while he was entitled archon. A beardless head right is always the obverse type. Sometimes it is accompanied by a pair of wings[22] and is believed to be Nike;[23] without wings the diademed male head is taken to be Asander.[24] Certain doubts arise in the case of the Nike attribution, for the winged head is clearly male;[25] however, the attributes (wings and helmet) are characteristic of a Nike type. It is possible that, in fact, Asander himself is depicted on the obverse of these coins while the attributes of Nike were used to strengthen the message carried by the reverse.

A ship's prow is always the reverse type on Asander's archon coins. In a few cases a trident is represented to the right,[26] close to the prow. This motif might have been adapted from Bosporan coinage of the third and second centuries B.C.[27] or from the city coinage of Panticapaeum from the late second century B.C.[28] The trident was an attribute of Poseidon and Asander certainly had reason to call on his support to secure independence and economic prosperity for his kingdom. The prow of a ship possibly was intended to commemorate a naval victory. Von Sallet[29] thought that Asander here celebrated his victory over Mithridates of Pergamon, while Gaidukevitch[30] preferred to postulate a triumph (unknown to modern scholarship) over pirates. Von Sallet's

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[21] Zograph, p. 302; Minns, p. 593. Of the 38 bronze archon coins in the catalogue, 30 are overstruck: 1a, 1b, 1c, 2a, 5a, 6a, 7a, 8a, 10a, 11a, 11b, 12a, 13a, 14a, 15a, 16a, 19a, 20a, 21a, 22a, 23a, 24a, 26a, 27a, 28a, 29a, 31a, 32a, and 33a.

[22] Obverse dies 1–6, 8, and 9.

[23] S. W. Grose, *Catalogue of the McClean Collection of Greek Coins* (Cambridge, 1929), 7391; Anokhin 255; B. F. Gaidukevich, *Bosporskoe carstvo* (1949), p. 586, n. 54.

[24] *SNGCop* 13; Anokhin, p. 79.

[25] Gaikdukevich (above, n. 23), p. 586, n. 5.

[26] Coins 12a, 13a, 13b, 14a, 21a, 23a, 26a, and 28a.

[27] Anokhin 148, Hygiainon; 156, Paerisades III; 166 and 171, Paerisades IV; 178, 178a, and 185, Paerisades V.

[28] Anokhin 173, 184, and 187.

[29] Von Sallet (above, n. 15), pp. 28–29; also W. H. Waddington, "Sur la Chronologie des rois des Pont et du Bosphore et des princes d'Olba," *RN* 1866, pp. 419–20.

[30] Gaidukevich (above, n. 23), p. 314.

opinion appears more probable; however it is also possible that the prow simply symbolized Asander's general reliance on his naval forces.[31]

Zograph[32] and Anokhin[33] identified two denominations of Asander's bronze archon coins, the obol and the tetrachalkon, the first weighing about 16.90 g with Asander's head as the obverse type,[34] the second weighing about 7.95 g with the (so-called) Nike head as the obverse type.[35] It should be noted however that Asander's bronze archon coins in the accompanying catalogue fall clearly into four weight groups: 1. the smallest denomination attested only by one example weighing 5.42 g,[36] 2. those close to Anokhin's tetrachalkon weighing from 6.20 to 8.37 g,[37] 3. coins of greater weight from 13.13 to 13.7 g,[38] and 4. those close to Anokhin's obol weighing from 15.36 to 18.42 g.[39]

Only one bronze coin is extant with the title BAΣIΛEΩΣ.[40] This small coin (2.12 g) seems to have been struck during Asander's first year as king for the letter Δ is inscribed on the reverse.[41] Reasons for the concentration of bronze strikings during the first four out of twenty-nine regnal years are not clear. The majority of Asander's bronze coins are overstruck on city coins which indicates that the city coins were in large supply during Asander's archonship. Political or propaganda purposes for the overstriking do not seem likely considering the care-lessness of the overstriking. Very often original types and inscriptions

[31] One of his admirals (ναύαρχος) commissioned an inscription honoring the king and his wife, *Corpus Inscriptionum Regni Bosporani* 30, hereafter, *CIRB*.

[32] Zograph, p. 302.

[33] Anokhin, p. 79.

[34] Anokhin 224.

[35] Anokhin 225.

[36] 27a.

[37] 7a, 6.2; 8a, 7.05; 6a, 7.07; 1b, 7.21; 3a, 7.65; 4a, 7.95; 9a, 7.97; 17a, 8; 16a, 8.13; 20a, 8.28; and 10a, 8.37. The heads on obverses 17 and 20 are unwinged, so the alleged correspondence between the so-called Nike's head and this denomination is doubtful.

[38] 33a, 13.13; 26a, 13.64; and 32a, 13.7.

[39] 19a, 15.36; 28a, 15.69; 23a, 15.82; 29a, 16.15; 21a, 16.22; 24a, 16.45; 11b, 16.58; 25a, 16.7; 22a, 16.78; 11a, 16.91; 13b, 16.95; 30a, 18.11; and 31a, 18.42.

[40] 34a.

[41] Anokhin, p. 80, discusses the meaning of this letter.

are easily recognizable, sometimes being even clearer than the over-struck types. It is possible that the bronze coinage (especially of larger denominations) struck during the first years of Asander's rule produced enough coins to serve the economic needs of the Bosporan market to the end of his rule. Such a conjecture is strengthened by the coinage of the contemporary Bosporan cities in which larger denominations were extremely rare,[42] although both Panticapaeum and Phanagoria continued striking tetrachalka and dichalka.[43]

Due to the poor condition of Asander's bronze coins and the fact that most were overstruck, only a few die links could be identified. Obverse 1 was struck with three different reverses; obverse 11 was struck with two reverses, with two examples of 11b being extant; and obverses 13 and 21 are paired with two reverses each.

THE CHRONOLOGY OF ASANDER

Scholarly opinion concerning the regnal years of Asander is unresolved: the beginning of his rule is dated from 50 to 44 B.C. and the end between 22/1 and 14 B.C. A general assumption exists that he ruled for 29 years, the exception being Koehne[44] who believes that he ruled for 37 years. Two methods of calculating the regnal years of Asander have been used. The first is based mainly on literary sources: Dio Cassius 54.24.4 placed the death of Asander in 14 B.C., so 29 years are counted back and the beginning of his rule is established in 44 B.C.[45] The second method is based on calculating the date of the end of his

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[42] Anokhin cites only one obol, 226, from Panticapaeum.

[43] Anokhin: 227, 247b–252. Also a dichalkon? *SNG* [*Great-Britain*], vol. 7, *Manchester University Museum* 758 should be mentioned. It has a unique reverse inscription ΠΑΝΤΙΚΑΠΑ(ΙΤΩΝ) ΒΑΣΙΛΕΩΣ ΑΣΑΝΔΡΟΥ.

[44] B. von Koehne, *Description du Musée de feu le prince Basil Kotschoubey...* (1857), vol. 2, pp. 155–58. He misread the inscription on some coins (p. 160) thus creating the archon stater from year 8 (this misreading seems to have been followed by Gaidu-kevich [above, n. 23], pl. 3, 55) and added 8 years of archonship to 29 years of kingship. His opinion was quickly criticized by von Sallet (above, n. 15), pp. 19–24, and Waddington (above, n. 29), p. 418 (see R. Hennig, "Die Regierungszeit des Asander," *Berliner Münzblätter* 1908, p. 87.).

[45] Beginning with Eckhel (above, n. 6), p. 367.

rule using numismatic sources.[46] The date of his death is placed before the beginning of the sole rule of his widow and successor Dynamis. The emission of gold staters with her portrait, the date according to Bosporan era, and the inscription ΒΑΣΙΛΙΣΣΗΣ ΔΥΝΑΜΕΩΣ indicate the beginning of her sole rule. Brandis,[47] however, emphasized Asander's total independence from the Romans and dated his regnal years from 48 B.C. (he dates Asander's mutiny against Pharnaces to 48 B.C.).

Scholars have made several assumption on which the dating is based. The first and the most commonly accepted deals with the number 29. We know that the latest date on Asander's coinage is ΘΚ, so it is generally assumed that this king reigned for 29 years. In fact years from Α to ΘΚ are only attested by the coinage and we do not know from which moment in his life he counted these years.[48]

The second assumption is that the first emission of Dynamis and the beginning of her sole rule marks automatically Asander's death.[49] Everyone seems to have concluded that during Asander's lifetime Dynamis would not have been allowed to strike coins with her portrait and title and without any reference to her husband and his dates. It should be stressed, however, that this phenomenon was not totally unknown in the hellenistic world. Posthumous coins with the portrait and name of Arsinoe II but without date were struck for a long time in Egypt and its dependencies.[50] In Ephesus similar coins with an inscription ΒΕΡΕΝΙΚΗΣ ΒΑΣΙΛΙΣΣΗΣ were minted.[51] During the lifetime of her husband Hieron II of Syracuse Queen Philistis had her coins struck with only a regnal date reference to her husband.[52]

These examples preceded the reign of Dynamis by about two centuries. They show only that minting coins by a hellenistic queen during her husband's lifetime was indeed possible. Those who make the

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[46] Starting with Von Sallet. This method has been followed by the authors of the catalogues of major collections, e.g. *BMCPontus*, p. 48; *SNGCop* 13 and 14.

[47] *RE* 3, s.v. "Bosporus," cols. 778–79 (Brandis).

[48] This problem will be addressed below.

[49] For example Anokhin, pp. 77–78.

[50] H. A. Troxell, "Arsinoe's Non-Era," *ANSMN* 28 (1983), pp. 35–70.

[51] Troxell, pp. 65–66.

[52] *SNGANS* 5, *Sicily* 3, 869–93.

assumption discussed above need to prove that Dynamis did not strike coins while her husband was still alive. To make this task even more difficult the personal position of Dynamis should be mentioned. It was strong enough to make the three following kings or pretenders (Asander, Scribonius, and Polemo I) court her. On an inscription she is mentioned as her husband's co-ruler[53] and she was chosen by him to be his successor (Dio Cassius 54.24.4).

Until recently the earliest known stater of Dynamis bore the date 281 Bosporan era 17/16 B.C., a date which neatly suited the evidence of literary sources, as 17/16 + 29 = 46/45. By adding one more year (for Asander could have died a year before Dynamis's first coin was struck), the beginning of his rule was placed in 47/46 B.C. roughly at the time of his well-known revolt against Pharnaces. However in 1983 a stater of Dynamis dated 277 B.E., 21/20 B.C., was found.[54] Adding 29 to 21/20 B.C., results in 50/49 B.C., three years before the revolt and actually in Pharnaces' heyday as the king of the Bosporus. To solve this problem V. A. Anokhin proposed a new hypothesis.[55] According to him, Pharnaces on the occasion of his daughter Dynamis's marriage with Asander granted the latter a share of power, the title archon, and the right to strike gold coins. Asander struck his archon staters for three years (Anokhin mistakenly read A instead of Δ on the reverse of 3a) and having defeated Pharnaces and Mithridates of Pergamon assumed the title ΒΑΣΙΛΕΥΣ not later than summer 46 B.C. Anokhin realized that Asander could not be granted this title either by Caesar or by Augustus and explains everything purely on the ground of Bosporan internal politics.

Unfortunately this interesting hypothesis is not supported by any sources. Anokhin misuses Appian's statement (*Mithr.* 120) that Asan-

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[53] *CIRB* 30 = *IGR.* 1, 874: βασιλεύοντος βασιλέως βασιλέων μεγάλου 'Ασάνδρου φιλορωμαίου σωτῆρος καὶ βασιλίσσης Δυναμέως; gen. abs. βασιλεύοντος ... βασιλίσσης) identifies Dynamis as a co-ruler, see M. Rostovtzeff, "Queen Dynamis of Bosporus," *JHS* 39 (1916), p. 99.

[54] This coin is in a museum in Yalta and was published for the first time as Anokhin 243.

[55] Anokhin, pp. 78–79. Also W. M. Leake, *Numismata Hellenica,* vol. 1 (1856), p. 47, thinks that Asander styled himself archon while governing the Bosporus in lieu of Pharnaces.

der ἐξήλασε [scil. Φαρνάκην] τῆς ᾿Ασίας as evidence of Pharnaces giving the Asiatic part of the Bosporus to Asander. He also ignores the explicit statement of Dio Cassius 42.46.4 that Pharnaces upon departing from the Bosporus for Pontus left Asander in the capacity of ἐπίτροπος (not archon). The possibility exists that Dio used the word ἐπίτροπος in a generic, not specific sense and that in fact Asander governing (ἐπιτροπῶν) the Bosporus bore the title ἄρχων. Yet in the Bosporus the word ἄρχων is not attested with such a connotation and in most cases it meant "king, supreme ruler."[56] Moreover Anokhin's hypothesis creates

[56] ᾿Αρχων or ἄρχοντος is attested 34 times in the inscriptions of the kingdom of the Bosporus and its dependency Tanais. Two inscriptions (CIRB 818 and 836) are preserved in so poor a state that nothing but this word can be read. One (CIRB 953) applies to Prusias ad Hypium, and another one (CIRB 1051) mentions ᾿Αγριππέων Καισαρέων ἄρχοντες but is dated A.D. 307 and therefore irrelevant. Five archons (CIRB 1237, 1242, 1245, 1251, and 1251a) as chief magistrates of Tanais appear (it should be underlined that Tanais was a dependency and not a direct part of the Bosporan kingdom). The remainder refer to various rulers: once Augustus was addressed by Dynamis as τὸν πάσης γῆς καὶ πάσης θαλάσσης ἄρχοντα (CIRB 1046), the others concern Asander's predecessors on the throne of the Bosporus (CIRB 6, 6a, 7, 8, 9, 10, 11, 18, 25, 75, 113, 825, 971, 972, 974, 1014, 1015, 1036, 1037, 1038, 1039, 1040, and 1111; SEG 34.755). So practically all legible inscriptions from the area of the Bosporus not later than the reign of Dynamis attest ἄρχων as either a title of Bosporan monarchs or—once—as "overlord, sovereign."

The official title of early Spartocid rulers of the Bosporus was ἄρχων Βοσπόρου καὶ Θεοδοσίης καὶ βασιλεὺς, Σίνδων, Τορετέων, Δανδαρίων, Ψησσῶν (CIRB 6, titles of Leukon I; other tribes mentioned include the Μαῖται, CIRB 10; Θατεῖς, CIRB 25; and Δόσχοι, CIRB 972). The title may have reflected the twofold character of the early Spartocid kingdom—kings seem to have been both hereditary officials of the Greek cities and leaders of the barbarian tribes (see "Bosporos" [above, n. 47], cols. 761–63; Minns, pp. 580–81; Gaidukevich (above, n. 23), pp. 62–63. The title archon was also used in official relations with Greek cities outside the Bosporus (Demosthenes 20.29). Beginning with Spartocus III, the Bosporan rulers called themselves simply βασιλεύς (CIRB 19 and 20) but ἄρχων was used almost interchangeably up to Paerisades IV (ca. 150–125 B.C.). Both titles are attested also in the coinage of the Bosporus. Leukon II (ca. 240–220 B.C.) minted coins with the title basileus (Anokhin 134–36), as did Spartocus V (ca. 200–180 B.C.) and his successors Paerisades III (Anokhin 156, 156a, and 161; Shelov, 159–61), Paerisades IV (Anokhin 166 and 171), and Paerisades V (Anokhin 178, 178a, and 185); in the meantime Hygiaenon (ca. 220–200 B.C.) used the title archon on his staters and drachms (Anokhin 148; Shelov, 157–59).

It may be concluded then that during the Spartocid period the meaning of the ἄρχων was clearly restricted to designate an official capacity of the monarchs of the

an unusual and unlikely situation: effective rule of Pharnaces combined with Asander's gold coinage without any reference to the actual king. There is no need to spend more time dealing with this hypothesis, daring but unsupported by the sources and unacceptable in the light of what we know about the history of the Bosporus. This hypothesis also shows clearly the dangers of overreliance on a single source (a coin) and calculating the regnal dates by mechanically counting back from the date of the first preserved coin of Dynamis.[57]

The Anokhin hypothesis also assumes that the chronology of Asander can be understood on the basis of Bosporan internal politics without taking into consideration the international (mainly Roman) context.[58] But again the sources available do not permit such an attitude. First Strabo (7.4.4) wrote that since the time of Mithridates VI the Bosporus was a subject of Rome.[59] Then Asander started his mutiny hoping for a grant of power from Caesar (Dio Cass. 42.46.4: ἐπανέστη αὐτῷ ὡς καὶ τοῖς ῾Ρωμαίοις τι χαριούμενος τήν τε δυναστείαν τοῦ Βοσπόρου παρ᾽αὐτῶν ληψώμενος). At that time he failed in his attempts to acquire official Roman recognition but, as Lucian attests (*Macr.* 17), at a later point he was recognized by Augustus and signed an amicitia treaty with the Romans. This testimony is confirmed by Asander's official title philoromaios. The frequent Roman intervention in the Bosporus (Pompey against Mithridates VI, Caesar against Pharnaces, Agrippa against Scribonius)[60] and Caesar's diplomatic interest in the Chersonesus[61] can

Bosporus. Since the sovereign aspect of this word is also attested by the inscription of Dynamis cited above, nothing compels us to accept Leake's and Anokhin's suggestions that suddenly under Pharnaces this word began to be used (in spite of Bosporan tradition) as a local equivalent of ἐπίτροπος. Rather Asander having captured power assumed this old, traditional title of the Bosporan monarchs, see Th. Mommsen, *The Provinces of the Roman Empire*, vol. 1 (1974), p. 313; Hennig (above, n. 44), pp. 86–87.

[57] It would be unwise to suppose that all emissions of Dynamis are known; just as Anokhin identified a coin with an earlier date, there may be others.

[58] "Bosporos" (above, n. 47), cols. 777–78.

[59] This statement may look paradoxical at first glance but the rebellion of Machares and his amicitia treaty with Rome (App. *Mith.* 83; Livy, *Epit.* 98; Plut., *Vit. Luc.* 24; Memmon, *FGrH* [Jacoby] 434 F 37.6) should not be overlooked.

[60] Dio Cassius writes about Polemo's struggle for the Bosporus (54.24.6): καὶ ἐνίκησε μέν, οὐ μὴν καὶ παρεστήσατό σφας πρὶν τὸν ᾽Αγρίππαν ἐς Σινώπην ἐλθεῖν ὡς

hardly be reconciled with the thesis of Bosporan total independence at that time. It seems reasonable to follow the more traditional viewpoint and consider the chronology of Asander and his coinage in the broader Roman context.

Asander happened to attract the attention of ancient authors almost entirely on the two occasions which are the most important from the chronological point of view: the beginning of his rule and his death. His rule began in a period of sweeping changes in the hellenistic world, a time in which the Romans set about eliminating the last independent monarchs. In 48 B.C. Pharnaces, his predecessor on the Bosporan throne, marched to Pontus and after having defeated the Romans commanded by Cn. Domitius Calvinus recaptured his father's kingdom.[62] On leaving the Bosporus he appointed Asander its governor (Dio Cass. 42.46.4). Asander mutinied against Pharnaces in hope of Roman recognition and at first deprived Pharnaces of control over the Asiatic part of the Bosporus (App., *Mith.* 120).[63] This probably happened early in 47 B.C. for we know that Asander waited to revolt until Pharnaces marched further away from him (Dio Cass. 42.46.4) which he did after having routed Calvinus (autumn 48 B.C.).[64] Then Pharnaces lost at Zela (2 August 47 B.C.), escaped to Sinope, and capitulated after a short siege (App., *Mith.* 120). Released by Calvinus

καὶ ἐπ'αὐτοὺς στρατεύοντα. οὕτω δὲ τά τε ὅπλα κατέθεντο καὶ τῷ Πολέμωνι παρεδόθησαν· ἥ τε γυνὴ ἡ Δύναμις συνῴκησεν αὐτῷ, τοῦ Αὐγούστου δῆλον ὅτι ταῦτα δικαιώσαντος. This passage shows both the military prestige enjoyed by the Romans among the people of the Bosporus and a direct interest of Augustus in modeling Bosporan policy. Therefore the Bosporus should be regarded as a client kingdom at that time.

[61] M. Rostovtzeff, "Caesar and the South of Russia," *JRS* 7 (1917), pp. 27–44.

[62] *RE* 19, s.v. "Pharnakes," cols. 1851–53 (E. Diehl); D. Magie, *Roman Rule in Asia Minor*, vol. 1 (1950), pp. 407–14.

[63] Nothing is known about the European part of the kingdom but that the cities Panticapaeum and Theodosia were later on recaptured by Pharnaces (App., *Mith.* 120). They may have either joined Asander or gained a short independence as Phanagoria did a few years earlier.

[64] W. Hoben, *Untersuchungen zur Stellung Kleinasiatischen Dynasten in den Machtkämpfen der ausgehenden römischer Republik* (1969), p. 27, discusses the revolt and formulates a hypothesis that in spring 45 B.C. Asander applied to Caesar for recognition—this is however unsupported.

Pharnaces moved quickly to the Bosporus and, supported by the Scythians and Sauromatians, recaptured Panticapaeum and Theodosia but then suffered defeat and death at the hand of Asander (App., *Mith.* 120 l.c.; Dio Cass. 42.47.5). In the meantime Caesar frustrated Asander's hope for recognition as the ruler of the Bosporus and appointed his friend Mithridates of Pergamon. This may have occured at the very end of August 47 B.C. when Pharnaces was still alive.[65] Mithridates must have spent some time collecting money, ships, and soldiers accomplishing his first objective by robbing a temple in Kolchis (Strabo 11.2.17); he then proceeded with further preparations. Since sailing in antiquity, save for rare exceptions, did not take place in late autumn and winter, usually not after 14 September,[66] it is very likely that the final struggle for the Bosporus between Mithridates and Asander took place in the spring of 46 B.C.[67] After his victory over Mithridates, Asander was the sole and, as far as we know, the unquestionable ruler of the Bosporus.[68]

Two accounts of Asander's death are preserved. Dio Cassius in a chapter concerned with the year 14 B.C. (54.24.4–7) writes that after the death of Asander a certain Scribonius declared that Augustus had bestowed power over the Bosporus on him. He then took over the kingdom and married queen Dynamis. Agrippa ordered Polemo I of Pontus to intervene while the people of the Bosporus arose and killed Scribonius. Polemo then seized the kingdom and, with the help of

[65] There are four relevant sources: *B. Alex.* 78; Strabo 13.4.3; Dio Cass 42.48.4; and App., *Mith.* 120. Dio Cass and the author of *Bellum Alexandrinum* contradict each other: according to the latter Caesar appointed Mithridates king of the Bosporus "qui sub imperio Pharnacis fuerat" while Dio writes that Caesar "πρός τε τὸν 'Ασάνδρον πολεμῆσαι ἐπέπεμψεν, ὅπως καὶ τὸν Βόσπορον κρατήσας αὐτοῦ λάβῃ, ὅτι πονηρὸς ἐς τὸν φίλον ἐγένετο. The greater temporal distance from the events described and the highly moralistic reasons of Caesar's decision cited by Dio make his account a bit less convincing, but it is probably impossible to establish whether Caesar intentionally pushed Mithridates to wage a war against Asander or he simply did not wish Pharnaces to be left in power. One may suppose that this appointment took place in the end of August 47 B.C. in Nicea where Caesar spent some two weeks setting matters for Asia, Magie (above, n. 62), p. 413 and n. 30.

[66] L. Casson, *Ships and Seamanship in the Ancient World* (1971), pp. 270–73.

[67] Von Sallet (above, n. 15), pp. 28–29; Hennig (above, n. 44), p. 87.

[68] Von Sallet (above, n. 15), pp. 28–29 and 32–33.

Agrippa (who marched to Sinope and threatened to step in himself), brought his new subjects into full submission.

Lucian (*Macr.* 17) does not provide us with any hints about absolute chronology but presents a dramatic account of Asander's death. The king, at the age of 93, had to face the rebellion of Scribonius and, after having learned that his soldiers had begun joining the usurper, committed suicide by starvation.

These are the only two accounts of the death of Asander. It seems impossible to reconcile them fully or to establish which of them is more reliable.[69] Nevertheless Dio's account should be examined first as it relates to absolute chronology. Dio mentions all the circumstances summarized above in his chapter beginning with the consular date 14 B.C. This date certainly applies to Agrippa's actions, for we know that he arrived at Sinope in spring 14 B.C. gathering the navy there and threatening the Bosporus with military intervention in support of Polemo.[70] This necessarily implies that both Polemo's military operations and obviously the revolt of Scribonius and the death of Asander must have happened earlier. Unfortunately Dio does not specify the time span between these events. We know only that Agrippa

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[69] The *Macrobi* was written about A.D. 212–23 (*RE* 13, "Lukianos," col. 1748 [Helm], following Hirschfeld, *Hermes* 24 [ΡΘΤΕ], p. 156) and is a collection of anecdotes. It is based on sources unknown to us compiled by an unknown author (certainly not Lucian although it is attributed to him). Brandis, "Bosporos" (above, n. 47), col. 779, rejects this account in deference to Dio Cassius. But the reliability of Dio Cassius is also not completely certain given the complexity of his sources, the possible lack of a good chronological source, and his method of historical criticism (see F. Millar, *A Study of Cassius Dio* [1964], pp. 34–38 and 83–92). Alternately it should be emphasized that some elements of the very short (actually one sentence long) statement on Asander are confirmed by other sources; the fact of Scribonius's revolt, by Dio Cassius; and Asander's title of basileus, by the coins. Asander's coins show that he used in chronological sequence two titles: archon and basileus, the latter being undoubtedly a higher rank. Also *CIRB* 30 confirms the recognition and signing of an amicitia treaty. Therefore elements of his narration unconfirmed by independent sources must be regarded as very likely. It is not surprising then that Lucian's version of Asander's death has been accepted by many modern scholars: Magie (above, n. 62), p. 472 and n. 29; *PIR* 1, s.v. 1197 Asander (A. Stein); *RE* 9A, s.v. "Vipsanius," col. 1263 (R. Hanslik).

[70] "Vipsanius" (above, n. 69), cols. 1263–64; M. Reinhold, *Marcus Agrippa. A Biography* (1933), p. 113.

dispatched Polemo to the Bosporus upon learning about the revolt (Dio Cass. 54.24.5) and this could not have happened before autumn 17 B.C. or spring 16 B.C., i.e. before Agrippa's taking charge of the east.[71] Judging by Agrippa's determination to restore Roman order in the Bosporus it seems likely that he did not delay his decision about sending Polemo against Scribonius. Dio's account does not allow for a protracted war in the Bosporus[72] and it seems that Polemo's expedition and possibly Scribonius's revolt took place in 15 B.C.[73]

If Lucian's account is accepted, the date of the death of Asander can be established exactly at the time of the revolt. Even if Dio Cassius's account prevails, suggesting Scribonius's arrival in the Bosporus after Asander's death, it would still be highly unlikely that Asander had died long before the beginning of Scribonius's affair. Asander nominated Dynamis his successor (Dio Cassius 54.24.4) and she is known to have signed an amicitia treaty with the Romans.[74] Scribonius could not have waited for long after Asander's death to stage his coup d'état, for he could not allow Dynamis to consolidate her power and receive formal recognition from Rome.[75] Agrippa's promptness to act (diplomatically

[71] "Vipsanius" (above, n. 69) col. 1259; Reinhold, (above, n. 70), p. 106; Magie (above, n. 62), p. 476 and n. 26.

[72] Scribonius's affair appears as a short episode and his early success in capturing the kingdom relied on a ruse: he gained the throne by proclaiming himself the appointee of Augustus (παρὰ τοῦ Αὐγούστου τὴν βασιλείαν, ἐπειδήπερ ὁ Ἀσανδρος ἐτεθνήκει, εἰληφέναι λέγων, Dio Cass. 54.24.4). As soon as the Bosporans learned the truth Scribonius lost his throne and his life.

[73] The date of 16 B.C. cited by so many historians seems to have been inspired by a necessity to end the reign of Asander before the first coin of Dynamis was minted. When the earlier authors were writing, her first known coin was dated 17/16 B.C. Now we know an earlier stater, from 21/20 B.C., so there is no longer an urgent need to date all these events so early and it may be safer to retain a date as close as possible to 14 B.C., the date supplied by Dio Cassius.

[74] All of Dynamis's inscriptions from the period of her sole rule can be dated after this treaty for she always bears the title philoromaios: *CIRB* 31, 38, 978, 979, and 1046. Once the name of Dynamis appears on an inscription (V. Latyschev, *Inscriptiones antiguae orae septentrionalis Panti Euxini*, vol. 1, 2nd ed. [1916], 354 from Chersonesus) without this title but its very poor condition makes any conclusion impossible.

[75] Recognition was after all a matter of the highest importance for a client king and one of the first steps after accession to the throne was to ask the Romans for it,

at first but not excluding military action as well) suggests that the
Romans were not going to allow things in the Bosporus to be unsettled
and there is no need to suppose that the process of recognition of
Dynamis may have been delayed. Therefore whichever version of
Asander's death and the subsequent events is accepted, it must have
happened at the very end of 16 B.C. or in 15 B.C.

The reign of Asander, then, stretched from the spring of 46 B.C. until
approximately 16/15 B.C. This is equal to 31 or 32 years of the
Bosporan era.[76] At any rate the number of his regnal years calculated
on the basis of literary sources is irreconcilable with 29 years—the
highest number confirmed by his coinage. There are two possible
solutions: coins minted in the last two or three years of Asander's rule
are not yet known or, if the coins with the date ΘΚ were struck in his
last year, Asander did not count his regnal years from the actual
beginning of his coming to power. Taking into consideration the years
from which no coinage exists and the statistical calculation of the
original number of obverse dies and die combinations (no more than
half are preserved), the first solution seems to be more plausible and
safer. However, the consequences of accepting this solution should be
examined in detail.

If Asander began to mint his staters in the first year of his actual
power, it means that coins dated A were struck up to October 46 B.C., B
to October 45 B.C., Γ to October 44 B.C., Δ to October 43 B.C., and so
forth. It means that for at least two years Asander struck staters
demonstrating his sovereignty against the will of Caesar[77] who was
obeyed by all the other petty rulers in neighboring Roman provinces.
On all staters dated with A, B, or Γ Asander bears the title archon; the
same title appears also on an issue from year four, when the title
basileus was also introduced. So the title basileus first appeared on

D. Braund, *Rome and the Friendly King. The Character of the Client Kingdom* (1984),
p. 26.

[76] His first regnal year began sometime early in 46 B.C. and lasted until October of
the same year. If he died before October 16 B.C. his last year was his thirty-first, if
after October, his thirty-second.

[77] A. Oreschnikow, "Nouvel essai de chronologie des monnaies d'Asandre,"
Annuaire de la société française de numismatique et d'archéologie 12 (1888), p. 6, year
708.

coins minted between October 44 B.C. and October 43 B.C., perhaps in
43 B.C. The explanation for this title is furnished by Lucian (*Mac*, 17):
Ἀσανδρος δὲ ὁ ὑπὸ τοῦ θεοῦ Σεβαστοῦ ἀντὶ ἐθνάρχου βασιλεὺς ἀναγο-
ρευθεὶς Βοσπόρου.[78] The title θεὸς Σεβαστὸς should not be misleading in
determining chronology: Lucian apparently mentioned the deified
Augustus by his best known name with no intention of invoking
January 27 B.C. The unusual title ethnarch given to Asander by Lucian
is not attested by any other source. But in the *Macrobii* this title
precedes the word Bosporus as on the coins the word archon does.
Therefore it seems that Lucian used the word ethnarch in its generic
and not specific sense,[79] designating simply the character of Asander's
dignity and not his exact title.

During the period of the Roman republic the recognition (apellatio)
of a client king was the domain of the Senate.[80] The testament that a
person was proclaimed king by a particular Roman meant that it
happened through the influence of this Roman and that the recognition
ceremony was presided over by him. No evidence exists for activity of
this kind by Octavian before his consular election, 19 August 43 B.C.
Only after his consular election could Octavian have presided over a
ceremony of apellatio. Further, one must realize that in a very short
time (before October 43 B.C., the end of Bosporan year) at least two
series of staters were minted.[81] It would also mean that Asander,
shrewd politician that he was,[82] applied to Octavian for recognition at
the moment when practically all of the east was in the hands of the
republicans (imperium maius over all governors of the eastern provinces
for Brutus was declared by the Senate in April 43 B.C. and promptly

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[78] For the reliability of Lucian, see n. 67; Mommsen (above, n. 56), p. 313, n. 1,
suggested Caesar instead of Augustus, but as he failed to supply any argument to
support this conjecture there is no need to sustain it, see Magie (above, n. 62), p. 413
and n. 29.

[79] See *LSJ*, ἐθνάρχης.

[80] Braund (above, n. 75), p. 24.

[81] Had Asander begun minting staters before his victories over Pharnaces and
Mithridates of Pergamon, in Bosporan year 251, 48/47 B.C., year 4 would be calcu-
lated from October 45 to October 44 B.C., but at that time recognition by Octavian
was out of the question.

[82] See Hoben's assessment (above, n. 64), pp. 32–34, of Asander's character.

enforced) and in case of their victory he might have been sure that his action would not have gone unpunished. The combination of all these unlikely events compels us to exercise caution in regard to this apparently safer hypothesis.

The second possibility is that Asander did not strike his staters at the beginning of his rule,[83] but started minting them and counting his regnal years after a certain period of time and continued this activity for 29 years until his death. This solution involves the hypothesis that Asander was afraid to strike staters without formal Roman consent,[84] although possibly minting undated bronze coins for local needs. After Caesar's death he may have gained (or bought, as Deiotarus did, Cic., *Phil.* 2.93 and *Att.* 14.12.1) recognition as a ruler of lower rank[85] and then begun to mint the A staters. The same obverse die continued to be used in the next Bosporan year. The obverse dies from years Γ and Δ should be looked at more closely. A profile on coins from year Γ bears a striking resemblance to that on coins of Marc Antony.[86] But long hair and a diadem similar to the style introduced into the Bosporus by Pharnaces[87] are a mystery only partially alleviated by Antony's long hair on some coins of Byzantium[88] and the diadem on some cistophoric coins issued about 39 B.C.[89] I cannot find any fully convincing explanation for this hairstyle. Was it an expression of heroization, an attempt to make the portrait of Antony conform to a local style of presenting rulers, or perhaps the result of following a pattern of plastic representation unknown to us?[90]

[83] Such a hypothesis was put forward by Giel (above, n. 11), pp. 10–12, followed by Hennig (above, n. 44), pp. 90–92, who dated the commencement of Asander's rule to 47 B.C. and the beginning of his gold coinage to 45 B.C. But this later date seems unlikely for the reasons stated above, n. 75.

[84] Minns, p. 592.

[85] Since it is only a hypothesis, it seems unreasonable to speculate further whether Antony or any other leading Roman politician at that time might have been involved, see Minns, p. 592; Rostovtzeff (above, n. 61), pp. 42–43.

[86] For example, Burachkov (above, n. 11), pl. 25, 48.

[87] Golenko and Karyszkowski (above, n. 8), pls. 2 and 3.

[88] E. Schönert-Geiss, *Die Münzprägung von Byzantion*, vol. 2, *Kaiserzeit* (1973), pl. 113: 1886, 1887, and 1889.

[89] *BMCRR* 2, p. 502, 133–34, for example.

[90] O. J. Brendel, "The Iconography of Marc Antony," *Hommages à Albert Granier* (1962), pp. 359–67, remarked that, in the period of the late Republic, portraits of such

If this really is a portrait of Marc Antony, it means that this coin was struck after Philippi (23 October 42 B.C.) and that Bosporan year Γ fell in 42/41 B.C.[91] Placing a portrait of Marc Antony on the obverse of a coin ought not to cause any surprise, for at that time the triumvir was fully in charge of the east and every client king had good reason to flatter him.[92]

The archon stater dated Δ presents an interesting problem. The obverse die consists of a head clearly in Roman style with short hair but the profile is less clearly identifiable. It does, however, resemble quite closely a portrait of Octavian on a coin of Amphipolis.[93] The Amphipolis coin is undoubtedly later (not earlier than 31/30 B.C.) than that of Asander and so could not have served as a pattern for a Bosporan engraver. Nevertheless a Bosporan pattern could have existed, not necessarily a coin, as other media, portrait busts for example, were available. There was a distinctive Bosporan style of representing Augustus under the reigns of Dynamis,[94] unknown king KΛE[95] and Aspurgus[96] following the same pattern as obverse 3 of Asander. If this identification is correct, minting of this stater may be seen as a fragment of a diplomatic campaign leading to the recognition of Asander as king by Octavian. This must have happened in the same year when the coin was struck, in all likehood in 41/40 B.C.

leading personalities as Pompey, Caesar, and Marc Antony were not as established and publicized as during the Empire. This permitted greater freedom of representation and problems of attribution exist for modern scholars.

[91] Adorning coins with a portrait of Marc Antony by an eastern dynast before Philippi is unlikely for the same reason as the dynast's seeking diplomatic recognition from Octavian at that time.

[92] Herod named a fortress in Jerusalem Antonia (Joseph., *AJ* 25.409 and *BJ* 1.401); Taracondimotus I of Cilicia called himself Philantonius (Hoben [above, n. 64], pp. 177–79 and 207); other dynasts renamed cities, an Antoniopolis is attested in Asia and another in Paphlagonia (A. H. M. Jones, *Cities of the Eastern Roman Provinces* [1971], pp. 168 and 398, n. 87). See also Braund (above, n. 75), pp. 64, 105, 109, and 111.

[93] *SNGCop* 92.

[94] Anokhin 259 and 262.

[95] Anokhin 280.

[96] Anokhin 288.

From that time on all staters bore on the obverse a portrait of the king, the reverse type remained unchanged, dates were continued from Δ to ΘΚ and the inscription proclaimed ΒΑΣΙΛΕΩΣ ΑΣΑΝDROU. So Asander's year Α would fall in 44/43 B.C., ΘΚ on 16/15 B.C., and it is very likely that Asander died (perhaps by committing suicide) during this last year of coinage. This second method of connecting Asander's regnal years with absolute chronology, although still conjectural seems to agree with the dates obtained from analysis of literary sources and appears preferable.[97]

CATALOGUE

Gold Coins

Obv. : Male head r., beardless, short hair (1 and 3) or long hair (2) and diademed (4–29).

Rev. : Nike l. on the prow of a ship, r. hand extended l. holding wreath, l. hand extended r. holding a long palm leaf.

Rev.: ΑΡΧΟΝΤΟΣ ΑΣΑΝΔΡΟΥ ΒΟΣΠΟΡΟΥ.

Year 1.

*1a. Rev. upper l. ΕΤ; upper r. Α; inner l. field 𝕬 and Φ. Anokhin 221a = Hess Leu 22, 4 Apr. 1963, 55 = Adolph Hess, 5 Apr. 1955, 32 = Zograph, pl. 44, 4 = *Jameson* 2541 = Giel, pl. 2, 22, 8.14

Year 2.

*1b. Rev. upper l. ET; upper r. B; inner l. field Φ. Anokhin 222 = Paris, Cabinet des Médailles 85, 8.17

Year 3.

*2a. Rev. upper l. ET; upper r. Γ; inner l. field A. Anokhin 223 (Vienna), 8.2; Gaidukevich, pl. 3, 55 (Moscow), 8.14

Year 4.

*3a. Rev. upper l. ET; upper r. Δ; inner l. field Ꜹ. Anokhin 221, 8.1 = BMQ 15 (1952), pl. 19, 21 (London)

Rev.: ΒΑΣΙΛΕΩΣ ΑΣΑΝΔΡΟΥ

Year 4.

*4a. Rev. inner l. field Δ and H. Lanz, 23 Nov. 1987, 207, 8.12 = Münz. und Med. FPL, May 1958, 179 = Münz. u. Med., 17–19 June 1954, 1149

*5a. Rev. inner l. field Δ. Anokhin 228, 8.19 = Museum of Fine Arts, Boston, *Greek Coins 1950 to 1963*, 137; Vienna, Kunsthistorisches Museum 15171, 8.13

Year 6.

*6a. Rev. inner l. field Σ; below monogram Ꙏ. M. Bernhart, "Führer durch die Staatliche Münzsammlung München," *Mitteilungen der Bayerischen Numismatischen Gesellschaft* 53 (1935), pl. 9, 11, 8.2

Year 7.

*7a. Rev. inner l. field Z, below monogram Ꙏ. Anokhin 230 (Leningrad), 8.23

Year 8.

*8a. Lead proof, rev. inner l. field H. ANS 74.226.33, 4.6

Year 9.

*9a. Rev. inner l. field Θ. Anokhin 231, 8.11 = ANS 1944.100.40986; British Museum; Collection Nanteuil 684, 8.38

Year 10.

*10a. Rev. inner l. field I. Hess-Leu, 24 Mar. 1959, 239 = *Jameson* 2147, 8.14; Berlin, Staatliche Museen P-O, 8.16
*10b. Rev. inner l. field I. Naville 12, 18 Oct. 1926, 1692, 8.13

Year 13.

*11a. Rev. inner l. field IΓ. Anokhin 233 (Leningrad), 8

Year 14.

*12a. Rev. inner l. field IΔ. Anokhin 234, 8 = Paris, Cabinet des Médailles 86

Year 16.

*12b. Rev. inner l. field IΣ. Anokhin 235, 7.85 = Paris, Cabinet des Médailles 87
*13a. Rev. inner l. field ΣI. Münz. u. Med. 41, 18–19 June 1970, 118, 8.06 = Hess-Leu, 6–7 Dec. 1966, 384 = Naville 17, 3 Oct. 1939 = Naville 13, 27 June 1928, 828
*13b. Rev. inner l. field ΣI. Glendining, 13 Dec. 1963, 294, 8.02 = Naville 16, 3 July 1933, 1327 = Naville 15, 2 July 1930, 858

Year 17.

*14a. Rev. inner l. field ZI. Anokhin 236, 8.09 = ANS 1944.100.40987
 15a. Rev. inner l. field ZI. Berlin, Staatliche Museen 28675, 7.94

Year 18.

*13c. Rev. innner l. field HI. Anokhin 237 (Paris), 8.02

Year 20.

*13d. Rev. inner l. field K. Anokhin 238 (Moscow) = Schlessinger 11, 26 Feb. 1934, 196 = Gaidukevich, pl. 3, 56, 8.06
*16a. Rev. inner l. K. Vienna, Kunsthistorisches Museum 37409, 8.54; *SNG* 14, 8.12; Paul Naster, *La Collection Lucien de Hirsch* 1405, 8.04; Sotheby, 20 Jan. 1898, 132, 8.78; Golenko, pl. after p. 102, 7, 8.17;[98] lead proof, *BMCPontus*, p. 48, 4

[98] K. V. Golenko, "O nekotorykh staterakh Asandra 20 goda pravlenia," *Numismatika i Epigraphica* 10 (1972), pp. 103–7, thinks all the 16a coins are modern

17a. Rev. inner l. field **K**. Zograph, pl. 44, 5

Year 21.

18a. Rev. inner l. field **AK**. Anokhin 239 (Leningrad), 8.06; Bank Leu
and Numismatic Fine Arts, 16–18 Oct. 1984 (Garrett 2), 237,
8.09; Bourgey, 29–31 May 1911 (Rous), 157.

19a. Rev. inner l. field **AK**. Zograph, pl. 44, 6

*20a. Rev. inner l. field **AK**. Hess-Leu, 16 Apr. 1957, 249, 8.13; Naville
17, 3 Oct. 1934, 521, 8.1

20b. Rev. inner l. field **AK**. Schlessinger 11, 26 Feb. 1934, 198, 8; Hess
208, 14 Dec. 1931, 534, 8.06

Year 22.

*20c. Rev. inner l. field **BK**. Anokhin 240, 8.02 = Naville 16, 3 July
1933, 1328 = Cahn 75, 30 May 1932, 353

Year 23.

21a. Rev. inner l. field **ΓK**. L. Mildenberg and S. Hunter, eds., *The
Arthur S. Dewing Collection of Greek Coins*, ACNAC 6 (1985), 2105
= Glendining, 27 May 1936, 57, 8.03

counterfeits made about 1870 by M. Sazonov from Kerch. His reasoning was based
on the presupposition that every lead stater must be a fake, and since all these coins
were struck from the same pair of dies as the lead proof *BMCPontus* 4, he considered
all the 16a coins to be counterfeits. His further arguments were: the exceptionally
high weight of the Vienna stater, the obverse portrait not resembling any other (but
in the same article Golenko argues that this coin was copied from 23 which makes
both his points unconvincing), the rough manner of the execution of the reverse,
certain paleographical features (elongated **B** and **Σ**, the uneven horizontal lines of **E**,
the low **Ω**, the short right arm of **V**, the arms of **Δ** equal to each other—according to
him these are exceptional in coin inscriptions of Asander). Yet these paleographical
reasons cannot serve as a serious argument because all the features mentioned above
but one (the low **Ω**) are confirmed on other coins. The high weight of the Vienna coin
(8.54) is not self-explanatory, even more suspicious is the weight of the Sotheby coin
(8.78, unknown to Golenko) so both are above the weight range of the rest of
Asander's staters, 7.85–8.38. However, having in mind the carelessness of Asander's
mint in respect to bronze coins, it is still possible to see these two coins as accidental,
deviations from the standard weight. Coins struck from this pair of dies did not
appear on the numismatic market at the same time as might be expected in the case
of counterfeits. The *BMC* coin was purchased in 1878, Naster's coin in 1881, the
Vienna coin in 1917, the Hermitage coin published by Golenko in 1925, and the
Copenhagen coin in 1928.

*22a. Rev. inner l. field ΓK. Berlin, Staatliche Museen I-B, 8.06;
      Sternberg 20, 20 Apr. 1988, 529, 8.07; Ciani and Vinchon, 6–7
      May 1955, 214, 8 = Hess, 7 Mar. 1935, 255 = Schlessinger 11, 26
      Feb. 1934, 197
 23a. Rev. inner l. field ΓK. Anokhin 241 (Moscow), 8.14

   Year 27.

*24a. Rev. inner l. field ZK. Myers 13, 9 Dec. 1976, 159, 8.02 =
      Malloy, 12 Mar. 1976, 3 = Sotheby 1908, 15
*24a. Rev. inner l. field ZK. Weber Collection 4701 = Helbing, 20
      Mar. 1928, 323, 8.05; Lanz Graz, 8–9 Dec. 1972, 87, 8.04
*25a. Rev. inner l. field ZK. Anokhin 243, 8.11 = ANS 54.2555
 26a. Rev. inner l. field ZK. Berlin, Staatliche Museen 7ux, 7.91; G.
      Hirsch, 28–30 May 1962, 149

   Year 28.

*27a. Rev. inner l. field HK. Anokhin 244, 8 = *BMCPontus*, p. 48, 2,
      pl. 10, 9 = Minns 26

   Year 29.

*28a. Rev. inner l. field ΘK. Hamburger, 12 June 1930, 290 =
      Vinchon, 24 Nov. 1969, 140, 7.9
 29a. Rev. inner l. field ΘK. Anokhin 245, 8.02 = *BMCPontus*, p. 48,
      3, pl. 10, 10

Bronze Coins

Obv.: Male head r., beardless, helmeted (1–10)
Rev.: Prow of a ship, trident to r. close to prow (12, 13, 14, 21, 23,
       26, 28)

Rev.: ΑΡΧΟΝΤΟΣ above, ΑΣΑΝΔΡΟΥ below

1a. Obv. cmk. star. Gaidukevich, pl. 3, 54
1b. *McClean* 7391, 7.21
1c. British Museum.

2a. *BMCPontus* 1.

3a. Naville 5, 18 June 1923, 2337, 7.67

4a. Anokhin 225 (Leningrad), 7.95

5a. Zograph, pl. 44, 8

6a. Paris, Cabinet des Médailles 90, 7.07

7a. Berlin, Staatliche Museen 92/1873

8a. Berlin, Staatliche Museen, Löbbecke, 7.05

9a. Berlin, Staatliche Museen 1–B, 7.97

10a. Berlin, Staatliche Museen 94/1873, 8.37

11a. W. M. Stancomb Collection 16.91

11b. Berlin, Staatliche Museen 6859/1955, 15.25; Paris, Cabinet des
Médailles 89, 16.58

12a. British Museum

13a. Minns 25

13b. Anokhin 224 (Leningrad), 16.9

14a. Cahn, 26 Nov. 1930, 1421.

15a. Minns 24.

16a. Cahn 71, 14 Oct. 1931, 394, 8.13 g

17a. Ratto, 4 Apr. 1927, 1697, 8 g

18a. Zograph, pl. 44, 7.

19a. *SNGCop* 13, 15.36 g

20a. W. M. Stancomb Collection 8.28

21a. ANS 1944.100.40988, 16.22 g

21b. Berlin, Staatliche Museen, Löbbecke, 17.6

22a. ANS 1944.100.40991, 16.78

23a. ANS 1944.100.40989, 15.82

24a. ANS 1944.100.40990, 16.45

25a. Vienna, Kunsthistorisches Museum 15689, 16.7

26a. Vienna, Kunsthistorisches Museum 7459, 13.7

27a. Vienna, Kunsthistorisches Museum 15170, 5.42

28a. Berlin, Staatliche Museen, Löbbecke, 15.69

29a. Berlin, Staatliche Museen 64/1927, 16.15

30a. Berlin, Staatliche Museen 93/1873, 18.11

31a. Berlin, Staatliche Museen, Rauch, 18.42

32a. *SNGFitz* 1602, 13.7
33a. *SNGFitz* 1603, 13.13

    Obv.: Helios.
    Rev.: Pegasus r., below **Δ**

Rev.: **ΒΑΣΙΛΕΩΣ ΑΣΑΝΔΡΟΥ**

34a. *SNGFitz* 1604, 2.12

FORGERIES OF THE AKSUMITE SERIES

(PLATES 5–6)   STUART MUNRO-HAY

The highland Ethiopian kingdom of Aksum issued a coinage of gold, silver, and copper/bronze from about the end of the third century A.D. until perhaps around A.D. 700. Some of the issues in bronze and in silver were also overlaid with a thin layer of gold on or around the royal bust, or in the central part of the crosses which appeared on the coinage after the conversion of the kingdom to Christianity around A.D. 330. The Aksumite coinage is now very rare, but even so several of the larger collections which have been assembled, both public and private, contain a considerable number of forgeries. Most are probably the result of the tourist trade in "antiquities" in Ethiopia, but some may be forgeries contemporary with the genuine issues. Some among the forgeries have entered the corpus of Aksumite coinage types as we know it, as authentic issues, and for the sake of both the private collector and the museum curator, such pieces should be identified. Conversely, in at least one case, a type which first became known through forged casts has now been authenticated by the appearance of struck originals.[1]

One gold piece which has caused some suspicion in the past can now be authenticated. The gold coin of Ezana in the British Museum which Anzani published in 1926[2] was questioned by Hill who noted that "its extraordinarily perfect condition and neatness of execution raise doubts of its authenticity."[3] Work on the gold content of the coins has already more or less authenticated the coin[4] but recently, the study of the large hoard of 868 gold Aksumite pieces found at al-Madhariba in southern Yemen has added extra confirmation.[5] Four more coins are now known with the same obverse die, two having also the same reverse die.

While it is certain that the majority of the forged Aksumite pieces are relatively recent productions, many being exhibited for sale in the tourist shops of Aksum, Addis Ababa, and other Ethiopian towns until the present, some of the forgeries have a longer pedigree. The coin given by Lord Grantley to the British Museum in 1898 (Plate 5, 1), which was published by Anzani,[6] has an obverse and reverse which in no way resemble an Aksumite coin, and it seems that it has, in fact, nothing to do with the series beyond its inclusion by Anzani in his catalogue as 281. However, there are some early forgeries of Aksumite pieces known. Schlumberger[7] illustrated a uniface copper coin from Aden, which Anzani thought, certainly correctly, to have been cast from a genuine gold piece, perhaps in antiquity.[8] Some of the forgeries in the ANS, New York, also have a certain pedigree; they date,

travels to study collections where forgeries have been recorded: the British Academy, the Twenty-Seven Foundation, and the Spalding Trust.

[2] Arturo Anzani, "Numismatica Axumita," *RIN* 1926, p. 58, 40.

[3] G. F. Hill, "Greek Coins Acquired by the British Museum, 1914–1916," *NC* 1917, p. 27.

[4] A. Oddy and S. C. Munro-Hay, "The Specific Gravity Analysis of the Gold Coinage of Aksum," *Metallurgy and Numismatics* 1 (1980), p. 77, 535.

[5] S. C. Munro-Hay, "The al-Madhāriba Hoard of Gold Aksumite and Late Roman Coins," *NC* 149 (1989), pp. 83–100.

[6] A. Anzani, "Numismatica e Storia d'Etiopia," *RIN* 5 (1928), p. 41; see also C. Conti Rossini, "Recensione de i 'Numismatica Axumita,'" *Oriente Moderno* 3 (1928), p. 139.

[7] G. Schlumberger, "Monnaies inédites des Ethiopiens et des Himyarites," *RN* 1886, p. 369, and pl. 19, 6.

[8] Anzani (above, n. 2), p. 66, 96.

according to their accession information, to before 1928. The collection, registered as 1967.79, was purchased from T. Kay, and was "collected by uncle in Ethiopia over 20–30 years. Died in 1928. Lived in Axum." Clearly, then, several of the forged types were produced some time before the larger influx of tourists; but none of these, as far as can be ascertained, have appeared from archaeological excavations and cannot therefore be linked with the genuine pieces as contemporaries. Indeed, the only "forgeries," if that is what they really are, found in archaeological contexts are the small-flan examples of the Anonymous Æ.1 issue found in Egypt.[9]

One or two types of forgeries published in the few works so far available on the Aksumite coinage series are specimens which seemed for various reasons—including some surprises in the iconography—to be entirely the creations of some imaginative designer, copying from the known repertoire of symbols, layout and legend, and producing new issues altogether. The most common of these, the MHDYS Æ.1 type[10] has now however been authenticated through the appearance of two struck coins. This in turn may possibly allow more credence to the rarer type, the Wazeba Æ.2,[11] although this has more unresolved oddities of design than the MHDYS silver.

The coins of this type have correct legends, far different from the badly copied or more or less invented Greek or Geʿez (Ethiopic) legends of the clumsier forgeries available from the tourist shops. But nevertheless, the two types have become known through cast forgeries. These and the not-unskillful attempts at copies of genuine coins are perhaps the most alarming manifestations for the Aksumite collector. Bent Juel-Jensen briefly notes that some Ousana silver pieces of the type without religious symbol are struck pieces, but each face is struck separately, leaving, as the giveaway, a join when the two halves are soldered together.[12]

[9] S. C. Munro-Hay, *The Coinage of Aksum* (New Delhi, 1984), p. 87. References to royal name, metal, and number follow the catalogue in this volume.
[10] Munro-Hay (above, n. 9), p. 93.
[11] Munro-Hay (above, n. 9), p. 69.
[12] B. Juel-Jensen, "A Modern Forgery of a Gold Coin of the Aksumite King Ousanas I," *NCirc* 98, 10 (Dec. 1990), p. 349.

At the moment, the types of forgery run from the local carvers' strange essays into coin making in the soft dark soapstone of the region, which are not easily mistakable for coins, through several intermediate types of more or less bad casts or copies, to these better productions. The main types apart from the better cast or struck forgeries are on rough metal flans with blurred designs, often only vaguely based on genuine pieces, with nonsense legends, or coarse casts of imitations of real coins, with the original design badly reproduced, angular and clumsy, but with all the elements of the design and legend present. Some of the rougher pieces seem to have been tooled to some extent after casting, producing a raised relief not at all resembling the genuine pieces. With some of the better reproductions of earlier coins, for example the Ousana(s) without religious symbol type, the work is sufficiently well done as to be highly deceptive; generally, however, the giveaway is the join or the file marks around the edge of the flan. It is uncertain, but some of these might possibly be contemporary forgeries.

The following list describes the main types of forgeries recorded in several years of study of a large number of Aksumite coins.

Endubis AV.1, Plate 5, 2–2a

The forgeries of this type seem to be mainly casts of a genuine piece. In general they are extremely blurred and pitted with tiny holes. The weight is usually a little less than the genuine pieces (ca. 2.25 g versus ca. 2.67 g) and the gold content of one, MH.3,[13] measured by Oddy, was 74% as opposed ca. 93–98% for the genuine gold coins of Endubis.[14] Another of the coarser type of forgery is 93% gold but weighs 3.14 g (Brereton collection, see Plate 5, 2a) compared with a highest figure of 2.81 g for an example in the British Museum.[15] A good illustration in color of the reverse of such a forgery appears in Scholz.[16]

[13] C. Munro-Hay, *The Munro-Hay Collection of Aksumite Coins*, Supplement 48 of the Annali, Istituto Universitario Orientale (Naples, 1986).

[14] S. C. Munro-Hay, A. Oddy, and M. Cowell, "The Gold Coinage of Aksum; New Analyses and Their Significance for Chronology," *Metallurgy and Numismatics* 2 (1988), p. 5, and A. Oddy, and S. C. Munro-Hay (above, n. 4), p. 77.

[15] Munro-Hay, Oddy, and Cowell (above, n. 14), p. 77, 512.

[16] P. Scholz, "Auf den Spuren der äthiopischen Vergangenheit zwischen dem Niltal und Arabia Felix," *Antike Welt. Zeitschrift für Archäologie und Kulturgeschichte*, 15 Jahrgang, vol. 3 (1984), pp. 1–34.

Endubis Æ.1, Plate 5, 3–4

These coins are often forgeries. They are casts of genuine pieces or in some cases struck pieces with the two separate sides soldered together; the edges bear the marks of the instruments used for filing the flans into shape. Some would appear from the wear to be possible ancient forgeries contemporary with their originals. There are also specimens of the coarse imitation type with more or less correct legends and design, but very angular and badly drawn. The specimen Plate 5, 4, seen at A. H. Baldwin & Sons Ltd. is on a very thick flan, with a die axis of 12:00 and obverse legend beginning at 7:00 CHΑΥΠΙCᴗBΛCIΛCYC and on the reverse beginning at 7:00 ΛϿWΙΙTWH ᴗ WICIΛΠXᴠ. The diameter is 14 mm, and the weight 2.51 g, both of which fall within the norm for the genuine examples of this issue. The reverse die is the same as that illustrated in Plate 5, 3.

Aphilas A.1, Plate 5, 5–9

There are several types of forgery of this tiny gold piece, the smallest ever issued in the Aksumite series. Some of them, of the coarse imitation type, are correct reproductions of the genuine pieces, but with the obverse bust very much thickened and badly prepared (eg. Plate 5, 5). A specimen in the ANS collection, 67.79.7, has several points of difference from the genuine pieces; it weighs 0.150 g in contrast to a usual average weight around 0.30–.34 g, the die axis is 3:00 whereas all the known genuine pieces are 12:00, and the reverse legend is incomplete, reading only AΦΙ ΛAC BAC (Plate 5, 6, 2 x). Another, in the Lenker collection, depicts the king wearing a necklace composed of five large blobs, and the royal head is very badly shaped. The reverse legend is correct, but the die axis is ca. 7:00 and the weight is 0.57 g. A similar piece had a correct weight, but was of 100% gold.[17] Two examples seen at A. H. Baldwin & Sons Ltd. have coarse obverse busts, one with a triangular ribbon and one with a rounded ribbon, with die axes of 10:00 and 6:00 respectively. The latter has the reverse legend written retrograde, beginning with ΦЖ. Weights are 0.22 g and 0.36 g (Plate 5, 7–8). A further example in the Brereton collection (Plate 5, 9) weighs 0.52 g and has a gold content of 81.48%.[18]

[17] Munro-Hay, Oddy, and Cowell (above, n. 14), p. 6, 606.
[18] Munro-Hay, Oddy, and Cowell (above, n. 14), p. 6, 607.

Aphilas Æ.1, Plate 5, 10

The forgeries of this type are very similar to those of Endubis Æ.1 already described, being casts of genuine pieces or struck and soldered specimens (Plate 5, 10). Some might be ancient forgeries.

Aphilas Æ.2, Plate 5, 11–14

There are three examples of forgeries of this type in the ANS collection catalogued as 1967.79.4–6 (Plate 5, 11–12). They are bad imitations; the design is the same as the genuine pieces, but the reverse legend is illegible. The obverse reads AΦIΛΛ BNCIOI. The reverse has a gilded surface. The die axis is correct at 12:00. The edges of these forgeries have the flattened planes with a sharper central ridge frequently found on Aksumite cast forgeries. Another forgery of this type, in the Bibliothèque Nationale in Paris, came from the collection of Claudius Côte (9.1962) and weighs 1.62 g in contrast to recorded figures for genuine coins of 0.62–.89 g. Two other specimens were recorded by A. H. Baldwin & Sons Ltd. On both coins, the die axis is correct, and the obverse legend reads Λ∇IΛΛ∽CΛCIΛI. Both faces are badly rendered particularly the reverse. The diameters are 11–12 mm and weights are 1.55 and 0.89 g (Plate 5, 13–14).

Aphilas Æ.2 and Æ version, Plate 5, 15–20

The ANS collection has four of these, 1967.79.9–12, in bronze, and one in silver, 1967.79.8 (Plate 5, 15–19). The legends are generally illegible and virtually invisible, and the pieces are sometimes blobbed with gold. A specimen seen at A. H. Baldwin & Sons Ltd. (Plate 5, 20) of the cast type with a flan with filed edges shows a roughly done royal bust on the obverse, with the legend reading ∽IILI CI ICΛLAYC, and on the reverse a large, rough depiction of a wheat stalk and the legend VI>ZCICS ИIZC.... The diameter is 15 mm and the weight 1.95 g. The metal appears to be very debased silver.

Ousanas Ν

Bent Juel-Jensen has published a gold coin of Ousanas which is apparently a struck piece, but of very crude design.[19] Legend and other

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[19] B. Juel-Jensen (above, n. 12), p. 349, illus.

features are extremely badly rendered, and, as is so often the case, the weight and gold content are radically wrong. The piece weighs 3.86 g and has a gold content of 98.9% and bears no resemblance to the weight and gold content of other gold pieces of the same king.

Ousanas Æ.2, Plate 5, 21–22

Coins of this type in an unusually thick and coarsely rendered style may be struck and soldered pieces or cast forgeries, perhaps contemporary. The silver of Ousanas can sometimes be very difficult to categorize as genuine or forged, there being apparently a range of styles from very fine and elegant royal busts, with the details well depicted, to much less distinguished renderings with rather rough indication of the features, the aigrette or cloth marks on the royal headgear, and the robes (see the ANS specimen, Plate 5, 21). The British Museum also has a cast forgery of this type (Plate 5, 22).

Ousana, without religious symbol, Æ.1, Plate 5, 23

Some mention has already been made of these pieces in the introduction. In some cases, as with the Ousanas Æ.2 type above, it is very difficult to be certain if one of these pieces is forged or genuine. There are wide variations in style, weight, and the preparation of the flan. Some of the forgeries are very good copies but have the usual join or filing marks around the edge of the flan. The illustrated example comes from the ANS collection. Some appear to have been cast rather than struck.

Wazeba Æ.2, Plate 5, 24

This type, like the MHDYS Æ.1 and Æ.1 until recently (see below), was only known from forged examples of casts which closely resemble the casts of the MHDYS Æ.1 issue. This type has several unusual features which seem to indicate that it is a forgery.[20] There are monograms on both obverse and reverse, unknown on any other silver of the period (although the later rulers Nezana and Kaleb used monograms). However monograms are unknown on any gold of the

[20] Munro-Hay (above, n. 9), p. 69.

period except for Wazeba's unique gold piece itself. The tiara worn by the king on the obverse and reverse of Æ.2 is only found on this piece: on Aksumite silver, all other issues showing the tiara (if at all) show it on the obverse alone. The robes do not resemble those on other contemporary pieces, nor does the outer beaded circle. The ribbon behind the neck is unusual for the time, being rounded, as are those depicted on the Wazeba AV.1. None of the pieces seen appears to be genuine: all have flans which are different from those of other Aksumite silver in appearance, resembling most closely the forgeries of MHDYS. A possibly genuine piece could be that published by Vaccaro[21] which has not been possible to trace and examine. This coin, which is broken, cannot be the original for the casts as both the obverse and reverse are different from the ANS piece illustrated here. Perhaps another struck piece exists from which the casts were made, as has proved to be the case with the MHDYS Æ.1 issue. Much more than in the case of the MHDYS coins, the unusual features of the design (although the reign fell during an innovative period of the coinage) may cast doubt on the genuiness of the type, and the problem will remain until struck pieces are found. The illustrated example is apparently a cast forgery, ANS 1969.202.1 (Plate 5, 24), with a diameter of 13 mm, weighing 1.251 g, and with a die axis of 12:00.

Ezanas AV, based on Ezanas pagan Æ.2, Plate 5, 25

This gold coin is of the same very crude imitation type as the Ezanas silver and bronze forgeries noted below.

> Obv. Cursorily drawn bust of king facing r., wearing headcloth, disc and crescent at 12:00, <Δ ?I ΓΖI7
>
> Rev. Wheat or barley stalk in center, N⋚Α ИΑΓ

A specimen measured for gold content was 98.7% gold. Its diameter was 13 mm, the die axis 3:00, and the weight 1.80 g. A cast in silver, exactly the same, was seen at A. H. Baldwin & Sons Ltd.; it weighed 1.60 g. Another gold example, seen also at Baldwins, weighed 2.32 g (Plate 5, 25a).

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[21] F. Vaccaro, *Le Monete di Aksum* (Mantua, 1967).

Ezanas Æ in the style of Ezanas pagan A/.1, Plate 5, 26–26a

> Obv. Bust of king, r. crowned, enclosed by two wheat/barley stalks, long spear in king's hand, disc and crescent at 12:00, ImNΠCB ΛCIΛE VO
>
> Rev. Bust of king r., wearing headcloth, surrounded by two wheat stalks, WIIUVƷ˥ CIΠCENˀHT

This coin constitutes a peculiar mixture of the Ezanas pagan gold type on the obverse, with a legend which (almost) reads HZANAC BACIΛEVC, while on the reverse the legend has some of the elements of a gold type of Ousanas, whose Bisi-title is ΠCENE. The illustrated ANS specimen (1967.79.6) published by Hahn (1983) among his forgeries, is not gold but silver. Another cast apparently from the same mold was seen at Baldwins (Plate 5, 26a). The design is so rough that there is very little chance of such a coin being taken as genuine. The die axis is 12:00, the diameter 15 mm, and the weight 2.12 g.

'Ezana Æ

> Obv. Bust of king r., to r. ˥HO ('Ezana).
> Rev. Type obv., only two letters visible ʌ ∞

The obverse lettering, from right to left, is also found in the South Arabian inscriptions of this king, but all of his known coinage issues are in Greek only. The reverse legend was probably meant to read ngs/'ksm (king of Aksum).

Ezanas Æ and A/, based on Ezanas pagan Æ.2, Plate 6, 27–35

> Obv. Bust of king r., disc and crescent at 12:00, ΣACI CZI˥ or ZAI CZIL
>
> Rev. Wheat stalk, sometimes disc and crescent at 12:00, MZA ИAC or HΣA ИALL

A common type of forgery, of the coarse imitation type, found in both metals and in slightly different styles; some are exactly the same in both metals. The ANS possesses examples in both metals (1967.79.21–24 in silver, and 25–30 in bronze). Illustrated are some ANS examples (Plate 6, 27–33) and silver and bronze example from Baldwins (Plate 6, 34–35) weighing 1.60 and 2.19 g respectively.

Ezanas pagan Æ.2 Plate 6, 36

> Obv. Bust of king r., surrounded by two concentric circles with hatched lines between the two circles, around bust UNI HTU, variants, eg. IHI JTⱢ
>
> Rev. A wheat stalk, crescent at 12:00, MZA ИАƆ

This coarse imitation type has been found in bronze only. Known die axes are either 12:00 or 6:00, diameter ca. 14 mm, and the illustrated forgery weighs 1.74 g.

Ezanas, broken legend

Vaccaro attributed a silver coin to a king he identified as Alelan.[22] Juel-Jensen has recently demonstrated that it is a brockage, a coin having stuck in the die and impressed its surface onto the next planchette struck. The broken legend can be restored by reading it as a mirror image.[23] Two forgeries of Ezanas' coins with broken legends are as follows.

> Obv. Rudimentary bust of king r., wearing headcloth, three concentric circles surround bust and legend
>
> Rev. Type similar, ..CI ...C (?BACI ΛEVC)

These coins perhaps owe their origin to a forger attempting to copy the name HZA NAC, but putting the two selections of the name in reverse order as well as rendering certain letters deficiently. The photograph (Plate 6, 52) is by courtesy of Scott Semans.

A piece seen at A. H. Baldwin & Sons Ltd. (B/V 35) is a more imaginative type of forgery.

> Obv. Bust of king r., wheat stalk to r. ⴖN C
>
> Rev. Four dots within circle, outside NTOIWⴖIWИOU.

Anonymous A/.1, without religious symbol

This coin, published by Tringali,[24] would appear to be a forgery based on the Anonymous Æ.1 type. It weighs 2.07 g and has a diameter of 12 mm.

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[22] Vaccaro (above, n. 21), 37.

[23] B. Juel-Jensen, "Vaccaro's Aksumite 'King Alelan': A Ghost Laid," *NCirc.* 95, 8 (Oct. 1987), p. 255.

[24] G. Tringali, "Due aurei Aksumiti inediti esposti all'Asuara Expo 79," *Journal of Ethiopian Studies* 11.1 (Jan. 1973), pp. 209–11.

Ouazebas Æ.1

The ANS specimen 1967.79.76 is a genuine bronze piece of Ouazebas which was at some later date completely covered by a layer of gold.

Ouazebas Æ.1, Plate 6, 37

> Obv. Keyhole shaped bust of king r. The only feature is an incised hole for his eye. Cross at 12.00 followed by CU_IITCU. Usual two flanking wheat stalks omitted.
>
> Rev. Type similar in circle, UZIITo.0.IIO

Another type of forgery, apparently based on the Ouazebas Æ.1 issue, is an exceptionally coarse example on a thick, yellowish, metal flan, partly broken. The die axis is 12:00, as in most genuine Ouazebas pieces, and the diameter is 20 mm.

MHDYS A/ .1, Plate 6, 38, and Æ.1

The silver version was first published by Sauter[25] although the first discovery of a broken example was by G. Tringali in 1971. Study of several examples including the Sauter piece established that they were all cast forgeries from the same mold, as was also the gold piece MH 87.[26] The latter weighs 2.41 g and contains 57.4% gold,[27] figures which radically differ from those for all more or less contemporary Aksumite gold coins and clearly establish its falsity. Whether MHDYS will later be discovered to have issued gold coins of his own, or whether he issued some of the anonymous gold, must await further discoveries, but it is interesting that neither he nor Ouazebas has gold pieces in the extensive al-Madhariba hoard, where every other gold type from Ezana to Kaleb is represented.[28] In the light of this hoard, it may well be that these two kings issued coins only in the lesser metals, MHDYS in both, Ouazebas (as far as present evidence indicates) only in bronze.

[25] R. Sauter, "Monnaie d'argent inédite du roi MHDYS," *Azania* 14 (1979), pp. 27–28, and appendix to S. C. Munro-Hay, "MHDYS and Ebana, Kings of Aksum; Some Problems of Dating and Identity," *Azania* 14 (1979), pp. 21–30.

[26] S. C. Munro-Hay (above, n. 13), p. 38, and pl. 8.

[27] Munro-Hay, Oddy, and Cowell (above, n. 14), p. 7, 623.

[28] Munro-Hay (above, n. 5).

As far as the silver type is concerned, with the later discovery by G. Tringali of two struck specimens—one is the prototype for the casts themselves, another has a second obverse die—the position of the coin in the Aksumite series has been firmly established. The publication by Atkins et al.[29] of the struck specimens and of a new bronze anonymous coin designated Anonymous Æ1.5[30] with features which provide a close precedent for the most unusual aspects of the MḤDYS silver, presents the evidence. The original 1971 photo, kindly sent by G. Tringali, shows a much worn and damaged coin, but apparently with a third obverse die (Plate 5, 54).

Anonymous Æ and Æ of the type Anonymous Æ.1

Apart from the copper example noted in the introduction, which has no obverse, the Bibliothèque Nationale, Paris, possesses a silver coin which seems to be a cast from the Anonymous Æ.1 type.[31] The Paris specimen is exactly the same as the Anonymous Æ.1 published by Schlumberger[32] and now known as one of the more common die combinations for the issue.[33] There is another in the ANS collection, 1954.173.1, and the illustrated example (Plate 6, 38a) is from a photo provided by Bent Juel-Jensen.

Ebana ('Esbael/Esbana') Æ1, Plate 6, 39

> Obv. From 12.00, ✠CI⊦✠CAX✠CΛ⊦ƆΛC
> Rev. From 12.00, ✠ΛNΛ⊦Ɔ⊦ΛCΛ⊦CCB

Anzani's coin A.127,[34] in the Kunsthistorisches Museum in Vienna, has two unusual features. First, it is exceptionally light, weighing only 1.04 g whereas 1.40–1.67 g is the normal weight for the type. Second, it

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[29] B. Atkins, B. Juel-Jensen, C. Mortimer, and S. C. Munro-Hay, "The Struck Silver Coins of the Aksumite King MḤDYS and the Cast Forgery. A Reconsideration," 99, 2 (Mar. 1991), pp. 39–41.

[30] B. Juel-Jensen, "A New Aksumite Coin from the Early Christian Period," *NCirc* 99, 2 (Mar. 1991), p. 39.

[31] Munro-Hay (above, n. 9), p. 90.

[32] Schlumberger (above, n. 7), p. 363, pl. 19, 4.

[33] Munro-Hay (above, n. 5), 818–28.

[34] A. Anzani (above, n. 6), 127.

lacks some of the letters of the legend on both obverse and the reverse. Possibly it is a contemporary forgery. The reverse is double struck.

Nezool A/.1, Plate 6, 40

> Obv. Bust of king r., wearing tiara, holding short stick dividing legend, surrounded by two wheat stalks, cross at 12.00, followed by ΘCOYC YXΛCCCΤIΛ
>
> Rev. Bust of king r., wearing headcloth, holding flail-like fronds (?fly-whisk or olive branch) dividing legend, bust flanked by two wheat stalks, after cross at 12.00 BΛCZΛ CVCI≳ Eϣ>ϣΛ

Only one example of a forgery of this type has come to light so far, a not very well executed copy on a heavy gold flan. The weight, usually between 1.44–1.67 g, is in this case 3.00 g, and the flan is much thicker than those of the genuine coins of this ruler. The die axis is 12:00.

Ioel Æ of Ioel Æ.1 type, Plate 6, 41

This forgery was recorded at A. H. Baldwin & Sons Ltd. from the Sotheby's sale of 10 Dec. 1962, 168. It compares exactly with the genuine Ioel Æ.1 type except for the coarse style. The center of the cross on the reverse is incuse rather than bossed. Another example seen also at Baldwins weighed 1.13 g.

Ioel Æ.2, Plate 6, 41a

Forgeries of this type, with no difference in the design from the genuine pieces, but only coarse imitations from the point of view of execution, are known from the ANS collection, 1967.79.152–54, and from two specimens seen at A. H. Baldwin & Sons Ltd. One of these latter coins (Plate 6, 41a) weighed 1.89 g, heavier than any genuine examples recorded. Both coins had a die axis of 10:30 and a diameter of 14 mm.

Ioel Æ.1

As well as the silver imitations of this type, there are others of this issue, in bronze. They, too, are merely coarse imitations, eg. ANS 1967.79.161.

Ioel Æ.3, Plate 6, 43

Forgeries of this type are casts executed in the coarse imitation style with more or less correct legends. Some have very marked circles of short lines forming the border around the edge of the coin (eg. ANS 1967.79.155–60). A specimen seen at A. H. Baldwin & Sons Ltd. has an obverse legend reading from 8.00 ЬꞀWΧΓΧᑎ and a reverse legend reading from 7.00 VΓΛ†ᴖ⊙ΛИҺ. The die axis is 4:30. The coin is of debased silver and weighs 1.24 g.

Ioel, Plate 6, 44

The British Museum has a cast of a forged coin, marked "Daniels," which seems to be based on two types of Ioel's coins. The obverse resembles Ioel Æ.1, and the reverse Æ.1.

> Obv. Bust of king l., wearing crown with trailing fillet, from 8.00 **UWO WИU**, divided by crown and fillet.
> Rev. Small Greek cross, with flared ends and sunken center, within a circle, the whole surrounded by the legend with another circle.

In the obverse legend, the **W** appears in the same position as in Ioel's Æ.1 type, but the rest of the legend is meaningless. The reverse legend is the same as his Æ.1 reverse legend. It clearly does not read **APECHXY** as it should, and only the characters **NUM** are distinguishable.

Another specimen of this type was recorded at Baldwins, from Sotheby's sale of 10 Dec. 1962, 173. The reverse legend, clearer, reads **WNIWꓭUWƆN**.

Za-ya'abiyo la Madkhen Negus, Æ.2 and **AGD** types, Plate 6, 45–46

Four specimens in the ANS collection (1967.79.199–202) have the monogram **AGD** (e.g. Plate 6, 45) with misshapen letters in both the monogram and the rest of the legend. The weights are far in excess of the norm for the genuine coins, one being 3.123 g. Some are gilded on the king's crown, as on the genuine examples. ANS 1967.79.203 is a forgery of this type, but in a different style. Another specimen, seen at Baldwins, resembles the four ANS examples 199–202, with gilded

crown, misshapen letters, and coarsely copied design. The die axis is 12:00 and the flan has the usual filed edges. The piece weighs 2.13 g (Plate 6, 46).

Armaḥ A/ ("Aboḥa") and Æ of Armaḥ Æ.1a, Plate 6, 47

These coins are very coarse imitations in gold (in one case) and in silver of the common bronze 1a type of Armaḥ with more or less nonsense legends. The type in gold was published by Vaccaro.[35] He attributed it to a tenth century king called Aboḥa, since he considered that the coin's evident debasement put it at the end of Aksumite coin production, which he believed lasted until then. The obverse legend reads ኁገWኽ Uበኌ, "King 'HBḤ." The Vaccaro specimen, now in the Gatti collection, weighs 3.72 g and is plated on a base casting metal, probably containing zinc (personal comment by W. A. Oddy). A silver specimen seen at A. H. Baldwin & Sons Ltd. (B/V 33) has the same rendering of the royal name with a reverse legend VИCWАበ UበበAA. Another Baldwin coin, B/V 36, has obverse ᐱW DⅩW C NⅫU and reverse WኁᚼበᏇUᏇᎸᚻᏇᏴ.

Armaḥ Æ.1, Plate 6, 48–50

The forgeries based on Armaḥ's silver issue are fairly common and are of the coarse imitation type; for example the ANS 1967.79.175–78. The first of these weighs 1.917 g as opposed to the normal weights which vary widely from 0.54 g for a worn specimen up to 1.12 g. Sometimes the legends can be completely distorted, for example oo ᚼበᛕበW on the reverse of one specimen (Plate 6, 48) and Uበኁ OⅫAᚼ on another, seen at Baldwins (Plate 6, 49). This latter weighs 2.58 g. The enlarged photo of an example with a correct legend (Plate 6, 50) is courtesy of B. Juel-Jensen.

Gersem Æ.1, Plate 6, 51

The forgery of this issue, of the coarse imitation type, has on the reverse the symbol ° to the right of the king's face; the letter ∠ is reversed in the obverse legend, and there is a dot to the left of the head. The weight of this piece (recorded by Joel Malter, Numismatic Fine

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[35] Vaccaro (above, n. 22), 70.

Arts) is 2.07 g in contrast to the recorded weights for Gersem Æ.1 of
0.73–1.01 g. Another example was seen at Baldwins, with a diameter of
15 mm, a die axis at 4:30, and a weight of 2.51 g.

Stone "Coins" Plate 5, 53

Included here is an example of a stone "coin" (provided by Scott
Semans of New Orleans). Such "coins" are very common in Ethiopian
tourist shops and are not really serious forgeries. Nevertheless, it is
interesting to see, carved in the black or greenish black local steatite or
soapstone, the same peculiar attempts at rendering an Aksumite coin
that have already been illustrated among the coin forgeries above.

> Obv. Within circle, king r., wearing headcloth. Outside circle,
> starting at 12:00 ΧΟΥΑϹΗΥΓƷИ ΥΤϹΟΡΑΙΧШΤ surrounded
> by another circle.

> Rev. Within circle, Greek cross with wide-splayed arms. Outside
> circle, starting at 12:00 ΥΤϹШΧϹΥΤΗΚΝΧϹΥΝΟꞆШ.

The diameter is 25 mm, and the legends have no recognizable meaning.

SIXTH-CENTURY VISIGOTHIC METROLOGY, SOME EVIDENCE FROM PORTUGAL

(PLATE 7)   D. M. METCALF, J. M. P. CABRAL, AND L. C. ALVES

In the years following the revolt of his son Hermenegild, Leovigild gradually reformed the Visigothic gold coinage, in ca. 579–86, including the royal name on the obverse, eventually modifying both the weight and the alloy of the tremissis, and placing the name of its mint place on every coin. These new debased tremisses were the model for the Visigothic coinage for more than 100 years during which period some 80 mints operated—although the bulk of the currency was produced at perhaps 12 to 20 major mints. The seventh century offers the monetary historian excellent opportunities for analysis, because virtually every coin can be assigned to a locality and can be dated usually within narrow limits. The standard catalogue, written by George Miles,[1] makes access to the information easy.

Before Leovigild's reform the situation is quite different. The coins are anonymous imitations of late Roman or Byzantine types, bearing the name (often severely blundered) of Anastasius I (491–518), Justin I

[1] G. C. Miles, *The Coinage of the Visigoths of Spain. Leovigild to Achila II*, Hispanic Numismatic Series 2 (New York, 1952), hereafter Miles. The publication of this essential monograph prompted an article to which the present study is in some sense a sequel: P. Grierson, "Visigothic Metrology," *NC* 1953, pp. 74–87.

We wish to express our gratitude to the directors of the União de Bancos Portugueses, S.A., and to the other owners who were so obliging as to allow their coins to be transferred to the laboratory for PIXE analysis.

(518–27), Justinian (527–65), or Justin II (565–78). Their reverse design is always the same—a Victory walking to the right, holding a wreath and palm branch. There is an unfortunate tendency to distinguish the series beginning with Leovigild's reform as the regal series, and the earlier type as pseudo-imperial or even pre-Visigothic. It should be clear, however, that the Victory tremisses are the standard currency of the Visigothic kingdom after its removal from Aquitaine and its settlement in the Iberian peninsula. Although the early kings did not place their names on the coins, it is reasonable to suppose that they did not fail to take a close interest in a matter lying so close to their profit and to good government. Nor need we doubt that the coins were struck at a variety of mints, even though they give no formal indication of their place of origin. The social context of the coinage did not change overnight: the same cities existed in 570 as in 590. The difference is that the coins are uncommunicative before Leovigild's reform.

They exist in large quantities. Wallace Tomasini catalogued[2] some 660 specimens, among which there are very few duplicate dies (implying an originally far greater number of dies than those from which specimens survive) and not many runs of dies which are so close in style that they can be seen to belong to the same production run or batch. Perhaps it is more to the point to state the converse by saying that, when one has taken out of account the longer runs of stylistically similar coins (which Tomasini rightly assumes to belong to major mints), there are a great many specimens left over. The numismatist's basic task of establishing *when* and *where* each coin was struck is extremely difficult in contrast with the same task for the years after ca. 580.

The approximate dating of the coins is provided by the imperial name, which gives at least a terminus post quem (although Justin I and II are in practice distinguished by style, and the legends can be so blundered that IVSTINVS or IVSTINIANVS are both possible readings). We do not know for a fact that changes of Byzantine emperor were followed promptly by the Visigothic coinage, nor that the various mints reacted in unison. In principle, the *when* would best be reconstructed

[2] W. J. Tomasini, *The Barbaric Tremissis in Spain and Southern France. Anastasius to Leovigild*, ANSNNM 152 (1964), hereafter Tomasini.

from an analysis of the composition of a series of hoards. Alas, only one of any size has been recorded, namely that from controlled excavations at Zorita de los Canes, the presumed site of Reccopolis, refounded by Leovigild in 578 and named in honor of his son Reccared.[3]

Given the paucity of hoards, the *where* could be recovered by mapping stray finds and comparing the geographical patterns of localization of particular styles. This again is quite impracticable, because only the merest handful of stray finds have been published. There are two other small hoards from late in the sequence, Real de la Jara (Seville) and La Hermida (Santander), but details are on record of only two specimens from the former and four from the latter.[4] We should recognize that, in the absence of find evidence in sufficient quantities to match the complexities of the problem, there are no alternative routes by which secure conclusions can be reached. Wilhelm Reinhart made some modest and reasonable suggestions by proposing five stylistic groups, A to E, which he assigned to Narbonne/Barcelona, Andalusia, Mérida, Toledo, and a group of miscellaneous styles.[5] Tomasini refined upon Reinhart's suggestions. What he did, in effect, was to assign certain broad styles to equally broad provinces, where many of the coins were from the principal mint, but where others in related styles might have been from minor mints within the same province.[6] They might, on the other hand, have been simply the work of other die cutters at the principal mint, perhaps at a different date. Tomasini also sometimes postulated the transfer of a style from one region to another —borrowing or copying. It has to be said that the attributions are speculative. Tomasini's proposals are well considered and deserve respect, but if they are correct it is more by inspiration than by proof

[3] The hoard awaits proper publication, but there are two rather blurred snapshots of it, from which a provisional assessment can be made, in X. Barral i Altet, *La circulation des monnaies suèves et visigotiques*, Beihefte der Francia 4 (Munich, 1976), at pp. 86–92 and pl. 4–11, hereafter Barral. The coins are also illustrated, rather more clearly, in Tomasini. The reader may also wish to consult the discussion in Miles, pp. 96–99.

[4] Barral, pp. 82–86.

[5] W. Reinhart: "Die Münzen des tolosanischen Reiches der Westgoten," *Deutsches Jahrbuch für Numismatik* 1 (1938), pp. 107–35; "Die Münzen des westgotisches Reiches von Toledo," *DJN* 3–4 (1940–41), pp. 69–101; and "Nuevas aportaciones a la numismática visigoda," *Archivo Español de Arqueología* 18 (1945), pp. 212–35.

[6] Tomasini sets out his premises with great care, pp. 154–57.

based on evidence. There is, in our view, not yet enough find evidence even to establish a broad regional grouping into groups A–E, given the stylistic complexities and ambiguities which have to be accommodated. It ought, in all conscience, to be easy enough for a numismatist to work out which coins belong to provinces as far apart as Catalonia and Andalusia, but an answer constructed without the benefit of sufficient evidence will remain shaky. Stylistic links into the signed coinage of the transitional period provide one or two important fixed points—particularly the coins of Hermenegild, which are fairly uniform in style and which for historical reasons must be southern.[7] They are, however, excessively rare, and the argument from style are to that extent limited. The **INCLITI REGIS** and **INCLITVS REX** coins, classified by Tomasini as group IR, are in the same general style as group H, and it seems natural to us to attribute them to the same region if not indeed the same mint city. They are much more plentiful. They name Leovigild, often with very blundered legends, but our numismatic instinct is to suspect that all is not what it seems. If Hermenegild struck coins at Seville during the several years of his revolt, the rare group H hardly fills the bill. The legends of the IR group are pointedly at variance with tradition, and it seems that the alloy, too, may distinguish these coins. The one specimen of group IR that we were able to analyze contained only 86 percent gold, exactly in line with the transitional issue of Leovigild, Miles 1, for which *MEC* 209 gives a specific gravity (SG) of 86 percent. It would seem, therefore, that the debasement (on the existing lighter weight standard of the mid-sixth century) was initiated in the south, and it would make more sense historically if the change belonged to the years of Hermenegild's revolt.

The coins in the northern coast hoard of La Hermida, with reverse legend **CLIVVIGILDIREGIS**, are again transitional (cf. Miles 1) but in another style, perhaps from a mint in Tarraconensis. Beyond that the clues are not numerous enough to match the complexity of the problem, taking into consideration the great variety of styles and the ambiguities and uncertainties of stylistic analysis.

Even the broad grouping rests on presuppositions, and we suspect, for example, that Reinhart, and Tomasini following him, may to some

[7] P. Grierson and M. Blackburn, *Medieval European Coins*, vol. 1. *The Early Middle Ages* (Cambridge, 1986), p. 49, hereafter *MEC*.

extent have underestimated the importance of the mint of Toledo, essentially through adopting an overly political view of the reasons why the Visigothic kings minted coinage. Although it did not become the fixed residence of the court until the 550s or 560s, Toledo was a city of considerable population already by the end of the fourth century and, because of its central location, became the meeting place for councils of the national church. We find it odd that so little of the Zorita de los Canes (Reccopolis) hoard, located northeast of Toledo and away from the main minting centers of the south, should be attributable on Tomasini's scheme to the Toledo mint, when only a few years later Toledo was so overwhelmingly Leovigild's main mint.

It should not be too difficult, given some additional find information, to reach a consensus on the broad provincial or regional attributions, but even when that task is achieved, we will have no means of knowing securely how many mints there were or when each of them was active. Only new hoards and new single finds, patiently gathered and studied, will repair what has been lost by detaching the surviving coins from their provenances. Archer Huntington, alas, seems to have cast old coin tickets away like sibylline leaves, and it may well take another hundred and fifty or two hundred years to duplicate information that has thus been lost, depending on the chances which bring hoards to light and on good-will and cooperation in recording single finds. Tomasini's corpus may well include coins from one or more hoards, now without provenance, and that may give an exaggerated impression of the plentifulness of certain varieties. A classification hardly deserves the name until it has been verified by using it to make sense of find evidence —and preferably after it has been shown to have predictive value. Meanwhile it is best regarded as merely a working arrangement.

There is worse news still to be digested. Not only can we not yet assign many of the stylistic groups to their places of origin, but also the integrity of the groups is debatable. Tomasini's classification of the 660 specimens that were available to him could not and cannot be bettered. It is exemplary for what it is. But it is constructed on the premise that every coin should be assigned to a class. Thus we have group A1, A1a through A1j, often with only one specimen constituting a subgroup, and so on through 94 groups and subgroups, not to mention some 20 unsorted coins. Simple arithmetic shows that on this basis there cannot be many large groups. Our experience in using the classification is that,

although the criteria of each variety are clearly stated, it is often difficult to decide exactly where a new coin belongs.

Although some of the larger groups are stylistically coherent, others are not. JI2, for example, consists of 26 specimens, of which 14 are without and 12 have a pectoral cross. The latter are so close to JI1 that we would hesitate to assert that they belong rather with the 14 coins of JI2 in terms of their mint attribution, unless there were some independent confirmation from the pattern of finds or of metrology.

Tomasini devoted intense effort to grasping all the nuances of style, and he summed up his interpretation of the whole mass of the data in a stemma (Fig. 1) which gives the reader a useful idea of the complexity of the evidence that has to be fitted into seventy years.[8] The groups are coded first by their imperial prototypes A, JI, etc. (Anastasius, Justin I, etc.) but we should note that the legends are often extremely blundered and that their absolute chronological value is uncertain. The stemma shows, for example, Justinianic varieties (JAN 2a, 8) leading directly into late Curru (C) varieties, without any intermediate coins modeled on Justin II (JII).
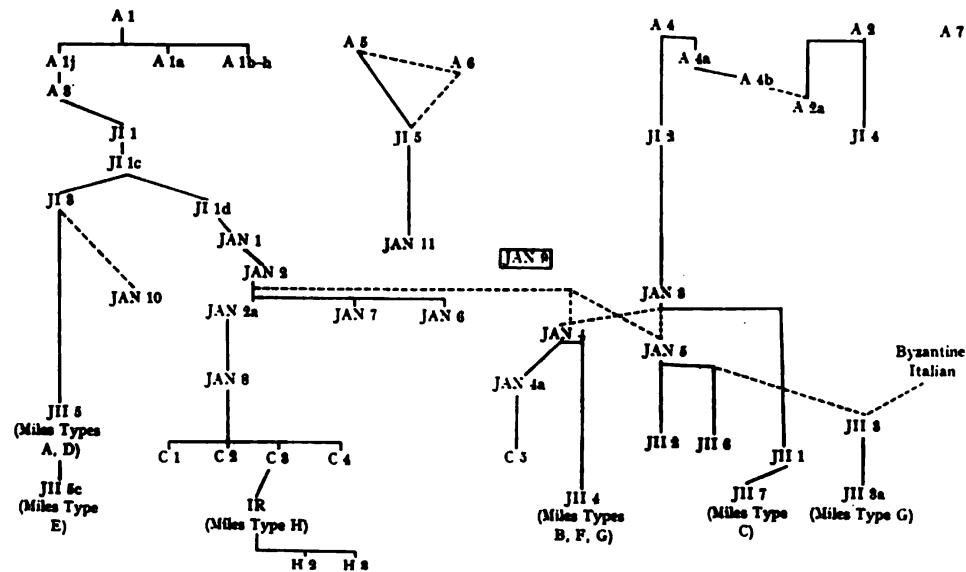
Fig. 1: Tomasini's Chart 8

[8] Tomasini, p. 288, chart 8.

The stemma is undoubtedly an important step on the way toward answering the questions when and where, but only at the level of major provinces. It does not elucidate the question of minor mints.

What are we really looking at, in this medley of stylistic variation? Could there have been not five, but 20 or 50 mints before ca. 580, in the same way that there were up to 80 after that date? Can we safely equate difference in style, i.e. the hands of different die cutters (or perhaps of some of the same die cutters at different dates), with difference of mint place? Can there have been a large fringe of unofficial or semi-official imitations of the royal coinage? Giving a coin a label, such as A1d, does not determine its status. The empirical evidence is so varied that it is capable of many different interpretations, and we have no independent guidance as to the kind of framework into which we are trying to fit it. We cannot securely deduce the framework from the coins themselves—at least, it is not possible to do so in face of the present scarcity of hoards and stray finds of known provenance.

That imposes severe limitations on metrological studies, which rely on comparing patterns of weight or fineness of groups of coins of a statistically suitable size, established as groups on prior and independent considerations. The method is flawed, if the integrity of the groups is not secure. One needs therefore to proceed cautiously. We do not wish to exaggerate the difficulties, but we do wish to mention the disservice done to numismatics by historians and archaeologists who rely on naive arguments.

On a broad view the weights of the sixth-century Visigothic tremisses are uniform, with a clear modal value in the range 1.41–1.45 g, except for the earliest varieties, which are heavier at ca. 1.49 g.[*] By maximizing the number of values falling into the central step it is possible to construct histograms with approximately normal distributions, which show that the coins were generally produced to a uniform weight standard, with careful adjustment of the flans, and with no sign of widespread culling of the heavier than average specimens. As a sample, we show histograms, drawn on the same scale and in percentage terms to make them visually comparable, of Tomasini's group A1, and

[*] Tomasini, pp. 296–97, chart 11.

A1a–j, and also JI1 and JI1a–h (Fig. 2). The derivatives of A1 are less closely adjusted than the main group, but are on average almost as heavy. If as seems to be the case there was a weight reduction ca. 520, then A1a–j belong before it.
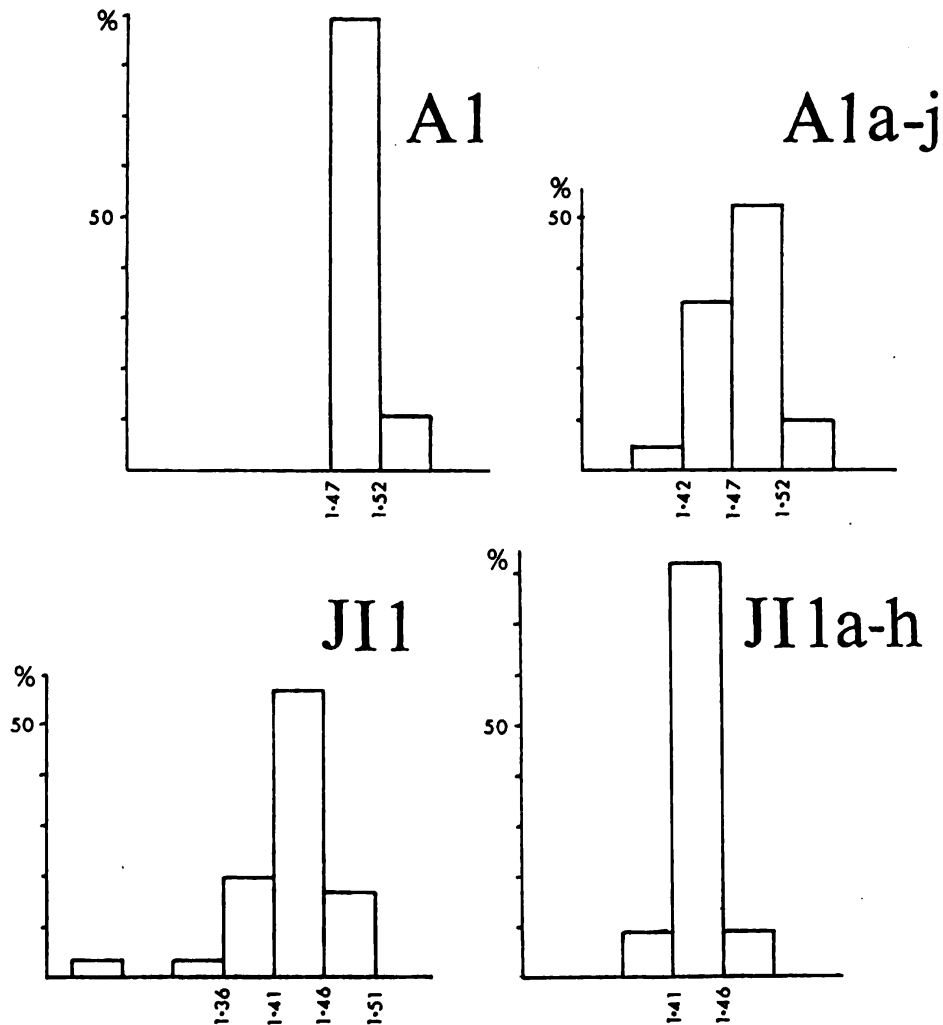
FIG. 2: Comparative Weights of Tomasini Groups

There was at least one further weight reduction late in the pre-reform series, which was carried through into the transitional issues. In the sequence C3 to IR to H in the stemma, which Tomasini divides (surpris-

ingly) between Toledo and Seville, group C3 has a clear modal value of about 1.29–1.33 g and so has group IR. Group H is too rare for a modal value to emerge at all accurately, although it may be 1.32–1.37 g.

The transitional coins of Leovigild with his name on the reverse (Miles 1; *MEC* 209) are again too rare for their weight standard or standards to be clear. Grierson and Blackburn see in their diversity a sign that they were struck at various mints, and we would concur with their judgment.

Any other of Tomasini's subgroups which deviate significantly from the 1.41–1.45 norm, such as JII2 or JII5, fall under suspicion of being late issues from mints that did not produce C3, IR, and H. Subject only to the accuracy of the modern weighings (which we have not checked) the histograms should provide reliable evidence in spite of any defects in the scheme of classification, in the sense that if any coins have been misclassified the true picture would be one of clearer patterns and differences than those obtained.

The intrinsic value of a gold coin depends on its alloy as well as its weight. Information is available about the fineness of only a small proportion of the early Visigothic tremisses, and it is worth pausing to consider whether we would be significantly better informed if we had data for virtually all of them. The available analyses probably constitute a random sample in respect to the broad picture, which is that most coins are of extremely fine gold, with content ranging from 94 to 98 percent, but a few fall as low as ca. 80 percent gold. Ideally one would draw histograms for each of Tomasini's subgroups in exactly the same way as for the coins' weights and look for any subgroups which did not conform to a normal distribution. In practice we have far too few results for that to be feasible, and there are technical problems in comparing results obtained by X-ray fluorescence (XRF), specific gravity (SG), and other more refined analytical methods. The normal distribution around the modal value of gold content is somewhat tighter, in percentage terms, than the distribution of weights, and experimental errors can easily be large enough to detract from the general results. But at the present stage of the investigation, the major limitation is that of insufficient data. Interest will focus on substandard coins. In some cases it may be obvious that their style is grossly inferior, but in others there will be nothing except the alloy to cast doubt on their official status, and the classification, as already

explained, is unlikely to assist, unless the specimen in question belongs to a subgroup of which the stylistic coherence is self-evident. An occasional lapse in fineness may arouse suspicion, but it is not enough to prove that a coin is irregular.

Eighteen coins, including one solidus, in the Oxford collection were analyzed by XRF in 1970.[10] The coins were analyzed four times on the same area, with abrasion between each pair of measurements, in order to discount any surface enrichment by persisting until stability of results was reached. Except for one patently imitative coin (88 percent gold) they were all of excellent gold (94–98 percent).

The silver and copper content could be measured only very approximately by the XRF spectrometer that was used in 1970. It indicated typically 2–3 percent silver and less than 1 percent copper—usually less than 0.5 percent copper. The correlation seemed to be poor, in that those specimens containing more silver still contained only minimal amounts of copper. That may mean that any extra silver entered the alloy with the gold.

A further 32 coins in Cambridge, including 3 solidi, were measured by SG, and the calculated gold contents were published in *MEC* in 1986.[11] Most of the values were 94 percent or above, at which level the uncertainties in the calculation arising from variable ternary alloys are small. As at Oxford, there was no obvious trend in the fineness in the course of the sixth century. All the solidi were exceptionally pure. The Tomasini subgroups in which specimens fell below 94 percent were:

Tomasini	MEC	Percent
A1	179	81
A2a	181	79
JAN2	195	90
JAN2a	196	91
JAN4b	201	74
JII7	206	88
C5	208	93

[10] D. M. Metcalf and F. Schweizer, "Milliprobe Analyses of Some Visigothic, Suevic and Other Gold Coins of the Early Middle Ages," *Archaeometry* 12 (1970), pp. 173–88.

[11] Plates 10 and 11. The SG analyses were made by W. A. Oddy in the British Museum Research Laboratory, to his accustomed very high standard: see p. 415.

If the distribution of the Oxford (XRF) and Cambridge (SG) analyses are compared, the histograms for the values above 90 percent are appreciably different (Fig. 3). If both collections had been random in respect to these finenesses, one would have expected a better match, even from quite small statistical samples, seeing that copper is present only in small amounts. We cannot explain how the differences have arisen, but part of the answer may lie in the calibration and accuracy of the measurements.
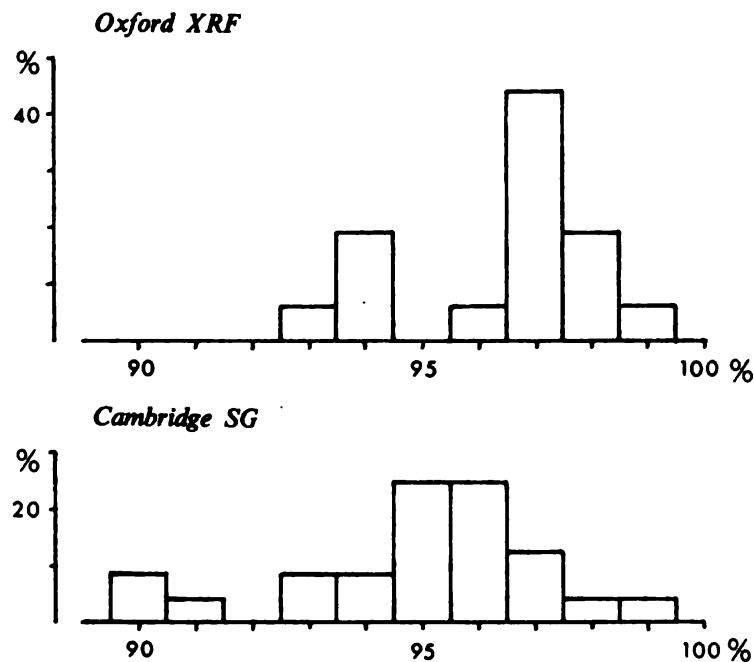
FIG. 3: COMPARISON OF OXFORD XRF AND CAMBRIDGE SG ANALYSES

We have now analyzed and studied a further 24 specimens from Portuguese collections, including two solidi, using a particle induced X-ray emission (PIXE) technique at the Instituto de Ciencias e Engenharia Nucleares, LNETI, at Sacavém. Each coin was analysed on two areas of the obverse and two areas of the reverse, but without abrasion of the surface. The reproducibility of the results was very good; and the experience from the earlier XRF analyses of similar coins was that surface variation rarely exceeded ca. 1 percent. We judge, therefore,

that the values obtained for gold from the PIXE surface analyses are likely to be slightly too high, but should on average be within ca. 1 percent of the readings that would have been obtained from abraded surfaces. We have used, for each coin, an average of the four readings. The results are set out in the Table at the end of this article, and the technical data are recorded in the Appendix.

Most of the coins are known to have been acquired in Portugal, and it is a reasonable assumption that most of them were found in Portugal. Those coded UBP were formerly in the Pinto de Magalhães collection, and have been catalogued with specific details about where they were acquired: UBP 11–13, 15–21, and 28 are stated to have been acquired in Portugal. The others were acquired after the publication of the catalogue in 1963 and could also be local purchases. It does not necessarily follow that a coin acquired in Portugal before 1963 was found there. One cannot be quite sure that any one particular coin in the sample is a Portuguese find, but one is probably entitled to assume that collectively most of them were. An exception is JRM 1, which was found in the region between Évora and Beja in southeastern Portugal.

The source of the coins adds a further dimension to our enquiry, because it was claimed by Reinhart that some of the Victory tremisses, in particular styles, were Suevic. Although he retracted this suggestion, it has remained current as a hypothesis. Pio Beltran defended it again, while Barral thought that the composition of the Zorita de los Canes hoard disproved it.[12] We are sceptical of what can be proved or disproved from one hoard. The only secure way forward would be to demonstrate contrasts between a number of hoards, or (much the same argument) to show in this case that certain recognizable subgroups had a westerly distribution of single finds, which differed significantly from that of most Victory coins. Reinhart did indeed claim that single finds from the northwest were distinctive in style and on a lower weight standard; and he published two Portuguese finds from Castelo

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[12] Barral, pp. 172–73, s.v. Castelo Branco. The first argument adduced by Barral (pp. 50–51) is inconclusive, because the Zorita hoard, containing only one stray Suevic *Munila* coin, does not necessarily prove that there were no later Suevic coins. The second argument, involving an attribution to Audeca, is no stronger than that attribution.

Branco.[13] One would need, obviously, more information to establish a case, but if Reinhart's suggestion were pointing us in the right direction, and if Tomasini's classification is soundly conceived, one ought in due course to begin to see that certain subgroups in the classification (which was not available to Reinhart) are distinctively Galician or northern Portuguese, and thus arguably Suevic. Metrology may or may not add support to the case: if any subgroups are in fact Suevic, they may or may not be on a different weight standard or alloy standard or both. Style and provenance are, however, the framework of the argument.
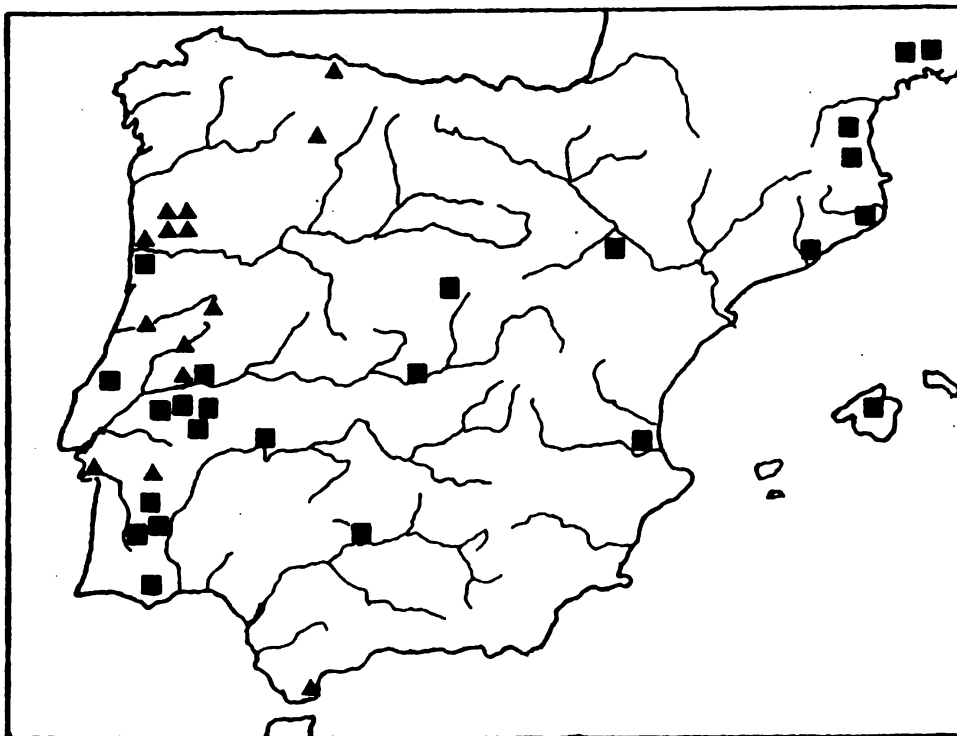
FIG. 4: SUEVIC AND VISIGOTHIC SINGLE FINDS

The map of sixth-century single finds (Fig. 4) shows that the Suevic Cross in Wreath and the contemporary Visigothic Victory tremisses essentially had mutually exclusive circulation zones.[14] There is one

[13] Barral, pp. 172–73, 25–26.
[14] The map is based on Barral, supplemented from A. Marques de Faria, "On Finds of Suevic and Visigothic Coins in the Iberian Peninsula and Their Interpretation,"

specimen, of group JII7, that was bought at Oporto in 1908 (*MEC* 206),[15] and there are four or five coins from Portuguese collections which Reinhart assumed to be northwesterly finds, but without find spots.[16] We mention these in order to be impartial, but we do not think that they throw much doubt on the geographical separation in the circulation of the two national types.

There is an interesting interface along the lower Tejo, which, if the numismatic evidence is to be relied upon, looks like the political frontier between the Suevic and Visigothic kingdoms. Castelo Branco is just to the north of the river, but there seems to be no exact record to show, for example, that the two Victory coins recorded from there were found actually in the town, and we would not attach too much weight to the statement that they were.

The information that Victory tremisses were (probably) found in Portugal is thus not enough to make them Suevic: southern Portugal was part of the zone of the Visigothic type, and there is no reason to think that it was Suevic territory. On the other hand, finds of Victory coins from the northwest are not what one would have anticipated from the map. The coins that Reinhart illustrated in support of his Suevic theory are not of one particular Tomasini category, and in any case there are only five of them, without any exact find spot or record of circumstances.[17] The hypothesis, in short, has never been adequately backed up with evidence, and Tomasini's subsequent work of classification has tended to undermine its credibility. We suspect that it was always rather vague and optimistic. There could conceivably have been a phase preceding the final Visigothic conquest and absorption of the

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Problems of Medieval Coinage in the Iberian Area 3, ed. by M. Gomes Marques and D. M. Metcalf (Santarém, 1988), pp. 71–88. We have added *MEC* 206, from Oporto, and coin 10 from our catalogue, found between Évora and Beja.

[15] *MEC*, pl. 11.

[16] Reinhart (above, n. 5) did not give chapter and verse for these, and Barral was not able to include any such finds in his inventory.

[17] W. Reinhart, "Die Münzen des Swebenreiches," *Mitteilungen der Bayerischen Num. Gesellschaft* 55 (1937), pp. 151–90, 79, 81–82, and 84–85. These coins have two things in common: their light weight and their being in Portuguese (not Galician) collections. P. Carvalho-Mirabeau, Lisbon, 79; Casa da Moeda, Lisbon, 81; A. Morroco, Idanha a Velha, 82; Reinhart, 84; E. Niepoort, Porto, 85.

Sueves in 585, when Visigothic money was being carried into the north-west—a phase of the currency magnified in the evidence, perhaps, if the troubled times provoked an unusual number of losses; but the moment to put forward a hypothesis such as that would be when there was firm evidence to be explained.

Our finds from Portugal include a high proportion of groups JAN8 and C (which belong together on the stemma)—11 out of 21 tremisses, or half, whereas the corresponding groups account for only 11 percent of Tomasini's corpus. These late coins are in even more marked contrast with the Zorita de los Canes hoard, which lacks any specimens of JAN8 and has only 5 of C. The hoard is, by contrast, heavily weighted JII2 and JII3 and their subgroups—52 specimens, accounting for most of those that are known. A few more contrasts as sharp as that would allow us to build up a solid framework within which to propose attribu-tions for the Visigothic tremisses of the sixth century. Until more hoards come to light, we should be willing to admit that the question is an open one.

JII2 and 2a comprise many very light coins, including specimens in the Zorita hoard, with weights in the range 1.1–1.2 g. The best expla-nation seems to be that they reflect an even lower weight standard than C3-IR-H, at some other mint or mints, very late in the prereform series, and not that they are Suevic.

The only examples assigned to any subgroup within JII in our Portuguese sample are two coins of group JII5. It is theoretically possible that several of the JAN8-C coins come from a single unrecorded or dispersed hoard. That would reduce their evidential value slightly, but even in that case, we think that the numerical and proportional contrast is sufficient to constitute evidence for attribution. It remains to be seen whether JAN8 (which Tomasini gave to Toledo) could be from the southwest, and therefore, perhaps, reflecting a currency fed from the major mint of Elvora (if one accepts the attribution to Elvora[18]) or Emerita, or, less probably, Ispali (Seville)—or whether new

[18] The equating of Elvora with Talavera is argued in D. M. Metcalf, "For What Purposes Were Suevic and Visigothic Tremisses Used? The Contribution of Topogra-phical Analysis, Illustrated by Some Comments on Single Finds from the Alentejo, and on the Mint of Elvora," *Problems of Medieval Coinage in the Iberian Area* 3, ed. by M. Gomes Marques and D. M. Metcalf (Santarém, 1988), pp. 15–34.

and more precise provenances will locate these or some other stylistic groups in northern Portugal and Galicia. We think that is unlikely, and certainly there is nothing in their weight or fineness to dissociate them from the Visigothic series.
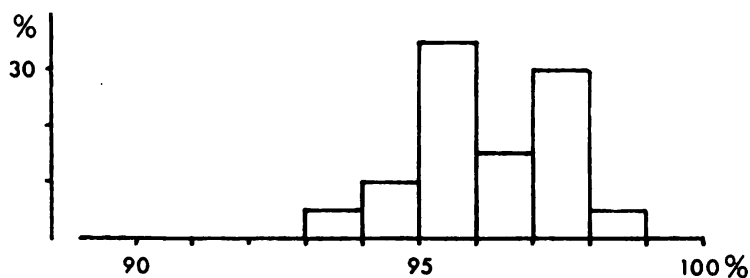
Fig. 5: Gold Content of Tremisses

The gold content of the tremisses in our sample is shown in Fig. 5. It matches, nearly enough, the SG results published in *MEC* (Fig. 3, above).

The PIXE analyses provide for the first time reliable figures for the minor constituents of the alloy, for the earlier XRF results are not much better than semi-quantitative. In the two solidi the copper content is below 0.1 percent. The tremisses only occasionally have less than 0.1 percent copper, and otherwise vary from 0.1 to 0.8 percent, with no sign of a trend during the sixth century. Silver varies inversely with gold, making up the bulk of the alloy. Again, there is no obvious trend. The alloy is contaminated with iron in measurable amounts, which rarely exceed 0.4 percent.

Examination of coin 6 (UBP 26) by optical microscopy raised some doubts about its authenticity. Similarly the analysis results for 3 (UBP 25) raised slight doubts. Their iron content is low, but not uniquely so, and there is otherwise nothing in the analyses which would condemn them. The low gold content of 6 perhaps indicates a contemporary counterfeit.

The gold content of the two solidi, both measuring 98.3 percent, is higher than that of the tremisses. These accurate PIXE results are supported by the SG analyses of three coins in Cambridge, calculated at 99, 99, and 98 percent, and by the XRF analysis of the one coin in

Oxford (99 percent), although the authenticity of that specimen has been questioned.[19] Even from this small sample, it seems safe to say that the solidi were of gold fully as pure as the Byzantine coinage of the sixth century,[20] and that their metal was refined to a distinctly higher standard than the tremisses. Both denominations were analyzed in the same way, without surface cleaning. The median value for the tremisses is ca. 96 percent gold, which is 2.3 percent less than for the solidi. The average difference ought, so far as we can see, to be evidence of good quality, even if the absolute values are a little on the high side because of gold surface enrichment.

We are intrigued to think that the same mint would have followed different refining practices for different denominations of gold coinage. There is no evidence of such a difference in the regular Byzantine coinage of the same period.[21] Are the solidi in fact from the same mint or mints as the tremisses? To judge from their style they could be accommodated into far fewer groups. Our instinct is that there was more than one mint: there are small differences of style that cannot convincingly be accommodated into a single sequence. A correlation between style and the terminal letter of the reverse legend might eventually show that it served as a mint mark. Obviously there are far too few specimens available to conduct such an analysis, much less to check it by reference to the pattern of finds. It is prudent, even so, to consider the monetary function of the solidi beginning from the evidence of their distribution pattern, which is shown in Fig. 6. There are only a half-dozen secure find spots, of which one should to some extent discount Duratón (near Segovia) where the coins in question are pierced gravefinds that could have wandered far from their region of origin. The most important source is the Seville 1 hoard, found within the modern city of Seville in 1972. Among 40 solidi the 9 most recent were of the Visigothic series (Anastasius, 1; Justin I, 4; and blundered? Justinian, 4).[22] The Sierra Tejea hoard contained an uncertain number

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[19] See the comments in Metcalf and Schweizer (above, n. 10), p. 179.

[20] C. Morrisson et al., *L'or monnayé*, 1. *Purification et altérations de Rome à Byzance*, Cahiers Ernest-Babelon 2 (1985), pp. 202–4.

[21] Morrisson (above, n. 20), with a note on some puzzling SG figures, possibly inaccurate, for Anastasius.

[22] Barral, pp. 78–80 and pl. 2–3.

of similar coins, of which the only one that has been illustrated names Justinian.[23] Then there are single finds from the vicinities of Faro and Portalegre, both in Portugal,[24] and from Mérida.[25] All that adds up to a quite compact distribution in and around lower Baetica.
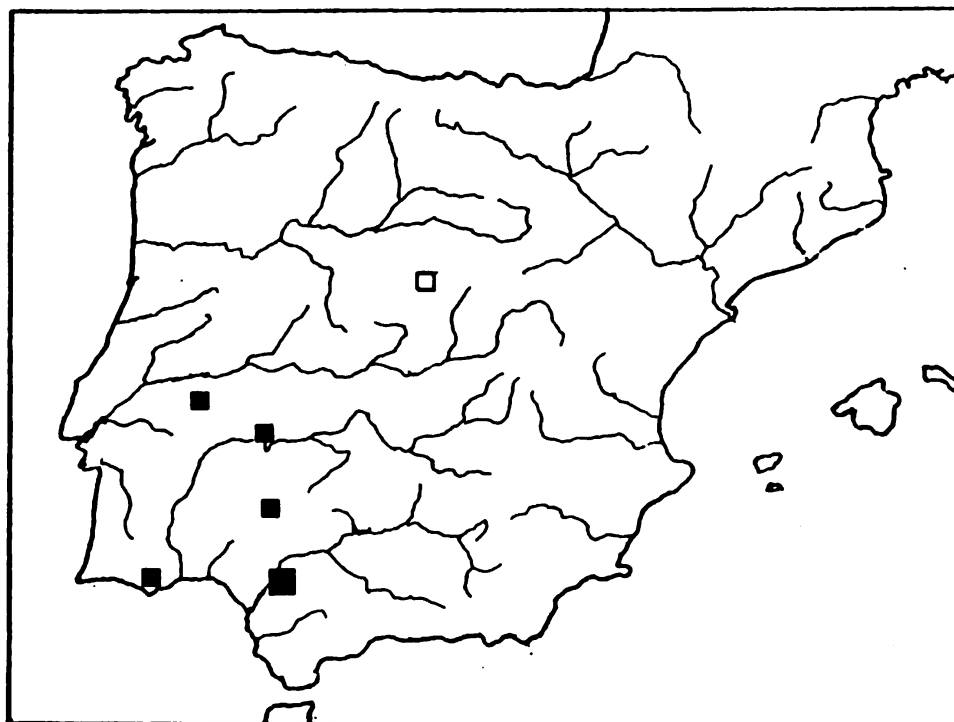
Fig. 6: Find Spots of Solidi

It is clear that solidi and tremisses were minted concurrently, and that they could be hoarded together. They may, nevertheless, have been targeted at different monetary needs. The modal weight of the solidi naming Justinian appears to be 4.38–4.40 g[26] (we await the evidence of the Seville hoard), whereas three tremisses, of slightly

[23] Barral, pp. 80–81.
[24] Marques de Faria (above, n. 14), pp. 72–73.
[25] Barral, p. 169, 3.
[26] Reinhart (above, n. 5, "Westgotisches Reiches"), pp. 94–95.

inferior alloy, might yield a mode of ca. 4.29 g. The beginning of the series antedates the Byzantine occupation (cf. the Seville hoard). Perhaps the coins were intended to be acceptable to merchants engaged in long distance trade in the Mediterranean.

In summary, the Visigothic solidi were of exceptionally pure gold, and tremisses of the sixth century were also of a very high and reliable standard of fineness, which was maintained throughout. The latest southern coins, of group C, are fully up to standard, demonstrating that the debasement of the INCLITVS REX group was a deliberate act, not the result of a downwards drift. The Portuguese finds, which unfortunately are rarely localized as between northern and southern Portugal, are weighted with Tomasini groups JAN8 and C, which are of the same alloy composition as all other groups. If there are any Suevic Victory tremisses (as has been claimed) we are not yet in a position to identify them. The evidence of many more stray finds will be required in order to attribute the coins of this complex series to their mints, and more hoards will be needed, similarly, to establish the chronology independently of Tomasini's typological sequences.

What remains to be learned from further analyses of the metal content of the sixth-century Visigothic coinage? A selective program of study of the very scarce transitional coins of groups C3, IR, and H is obviously desirable, in order to confirm (as seems likely) that the INCLITVS REX group is already systematically debased and to measure its variability.

Until we reach the transitional types, the indications are of a uniform alloy. Fingerprinting the gold in order to distinguish different sources, for example for Suevic and Visigothic coins, would require more sensitive measuring for particular elements than we were able to achieve. The spectacular results obtained at Orléans from a study of traces of platinum[27] (which survives the refining process in an unchanged proportion to the gold) make us wonder whether there are similar advances to be won through an accurate measurement of trace elements, particularly the platinoid group, in the Visigothic series.

[27] Morrisson (above, n. 20), pp. 92–5.

CATALOGUE

All the coins are illustrated on Plate 7. Weight and current provenance are indicated in the Table.

Solidi

Justin I

1. *Obv.* **DNIVSTIN VS PPAVC.** Cf. Reinhart, "Westgotisches Reiches," pl. 7, 10, and "Nuevas aportaciones," fig. 2, 1, but the ornament on the front of the bust is less elaborate. There is, unusually, no plume surmounting the helmet, and the style of the die is generally closer to that of a copy in the name of Anastasius, "Westgotisches Reiches," pl. 7, 2. The legend is broken in the same way as on "Nuevas aportaciones," fig. 2, 1. On the reverse, the staff is pelleted and has a large P, again as on "Nuevas aportaciones," fig. 2, 1. The final letter of the reverse legend appears to be an unbarred Λ.

Justinian

2. *Obv.* **DNIVƧTI N NANI.** The style of the obverse is rather stiff and flat, with neat lettering, and no exact parallels can be cited. On the reverse the terminal letter is **H**. The staff is linear. Acquired in Switzerland.

Tremisses

Justin I

3. Cf. Tomasini 140 (JI, 1).
4. Cf. Tomasini 153, 155 (JI, 1).
5. Cf. Tomasini 198, 201 ? (JI, 2, where, however, the later part of the sequence is close to JI, 1).
6. The S-shaped curve of the angel's wing finds no close parallel among the coins in Tomasini's corpus. The obverse is reminiscent

of his 132–33, but with a less prominent nose. The gold content (78.3 percent) suggests a contemporary copy.

7. Cf. Tomasini 314 (JAN3a), and evidently by the same hand.
8. JAN5.
9. JAN5. Similar to 8.
10. JAN5.

JUSTIN II

11. Cf. Tomasini 504 (JII5).
12. Cf. Tomasini 510 (JII5).

GROUPS JAN8/C1.

These two groups are closely linked in the stemma. Stylistic criteria by which their attribution might be determined include the treatment of the hair, and the variation in the exergual legend.

13. The hair on the crown of the head is indicated by lines almost at right angles to the diadem or curving downward—characteristic of group JAN8. In exergue, CONOƆ.
14. Similar.
15. Similar, but exergue reads C·N·Ɔ.
16. Note the hair swept upward on the back of the head—characteristic of group C. In exergue, ONOC.
17. Similar, but ONOƆ or CONOƆ.
18. Similar, ONOƆ.
19. Indeterminate hair style. In exergue CONOƆ. Derivative?
20. Similar.

MORE DEVOLVED SPECIMENS OF GROUP C

21. Cf. Tomasini 573–87. Group C3, with swept-up hair. In exergue (characteristically) ΛОИОΛ.
22. Cf. Tomasini 599. Group C5.

UNCLASSIFIED

23. The style of drapery of the bust appears to be late.

Inclitus Rex

24.   Tomasini 619.

APPENDIX

Details of the Particle Induced X-Ray Emission Technique

The PIXE analyses were done with the proton beam of a 2 MV Van de Graaff accelerator at the Instituto de Ciências e Engenharia Nucleares. LNETI (Sacavém, Portugal) with an energy of 1.7 MeV and a current of about 5–10 nA. Details of the technique employed have been described elsewhere.[28] The X-rays produced were measured using a Si(Li) detector with a resolution of 210 eV FWHM at an energy of 5.9 KeV. The X-ray spectra were analyzed by the AXIL fitting program,[29] and the calculations of the metal content were done assuming that all the elements visible in a spectrum add up to 100 weight percent.

The coins were first examined under a microscope. Most of them showed traces of wax-like deposits on the surface, which were carefully removed with a stylus and the surface cleaned with acetone. Non-destructive analyses were made of at least four areas of the surface, two on the obverse and two on the reverse which are distinguished in the Table with the labels O and R respectively.

As seen in the Table, the precision (reproducibility) appears to be very good, particularly for gold which varied about ± 0.2%. The accuracy, when the analyses are carried out on gold-silver-copper standards, is also very good. However, since the coins were not abraded to remove surface layers, the results obtained can only be regarded as approximate with a tendency to overestimate the gold content and to underestimate the silver, copper, and iron content of the alloy. Comparing these data with those from the study made by X-ray fluorescence spectrometry to establish the degree of surface enrichment in similar coins, there is a very high degree of correlation.

[28] G. P. Ferreira and F. P. Gil, "Elemental Analysis of Gold Coins by Particle Induced X-Ray Emission (PIXE)," *Archaeometry* 23 (1981), pp. 189–97.

[29] P. Van Espen, K. Janssens, and J. Nobels, "AXIL-PC, Software for the Analysis of Complex X-Ray Spectra," *Chemometrics and Intelligent Laboratory System* 1 (1986), pp. 109–14.

TABLE

PARTICLE INDUCED X-RAY EMISSION RESULTS

Coin No	Collection Ref.	Weight in grams	Analyzed Area	Percent Au	Percent Ag	Percent Cu	Percent Fe
1	DTA3	4.405	O1	98.3	1.5	0.04	0.15
			O2	98.5	1.0	0.05	0.45
			R1	98.3	1.4	0.03	0.22
			R2	98.2	1.3	0.06	0.43
			Aver	*98.3*	*1.3*	*0.05*	*0.3*
2	AM29	4.271	O1	98.3	1.5	0.09	0.07
			O2	98.4	1.4	0.08	0.09
			R1	98.2	1.6	0.08	0.09
			R2	98.3	1.5	0.08	0.07
			Aver	*98.3*	*1.5*	*0.08*	*0.08*
3	UBP25	1.443	O1	97.5	2.0	0.4	0.1
			O2	98.0	1.5	0.3	0.1
			R1	97.4	2.0	0.5	0.1
			R2	98.1	1.5	0.3	0.1
			Aver	*97.8*	*1.8*	*0.4*	*0.1*
4	UBP11	1.435	O1	97.5	1.8	0.3	0.4
			O2	97.2	1.7	0.3	0.8
			R1	97.4	1.8	0.3	0.5
			R2	97.1	1.7	0.3	1.0
			Aver	*97.3*	*1.7*	*0.3*	*0.7*
5	UBP12	1.448	O1	95.1	4.3	0.4	0.2
			O2	95.4	4.0	0.4	0.2
			R1	95.1	4.4	0.3	0.2
			R2	95.2	4.3	0.2	0.3
			Aver	*95.2*	*4.3*	*0.3*	*0.2*
6	UBP26	1.220	O1	78.0	21.5	0.4	0.1
			O2	77.4	22.2	0.4	0.1
			R1	79.4	20.1	0.3	0.2
			R2	78.4	21.1	0.3	0.2
			Aver	*78.3*	*21.2*	*0.3*	*0.1*
7	UBP22	1.385	O1	96.3	3.4	0.2	0.1
			O2	96.6	3.1	0.1	0.1
			R1	96.2	3.5	0.1	0.2
			R2	96.2	3.5	0.1	0.2
			Aver	*96.4*	*3.3*	*0.1*	*0.2*

Coin No	Collection Ref.	Weight in grams	Analyzed Area	Percent Au	Percent Ag	Percent Cu	Percent Fe
8	UBP18	1.377	O1	94.6	4.3	0.8	0.3
			O2	94.3	4.5	0.9	0.3
			R1	93.9	4.8	0.9	0.5
			R2	94.2	4.4	0.4	0.3
			Aver	*94.3*	*4.5*	*0.8*	*0.4*
9	UBP28	1.437	O1	95.0	4.1	0.6	0.4
			O2	95.0	4.2	0.6	0.2
			R1	96.0	3.1	0.4	0.4
			R2	96.3	3.1	0.4	0.3
			Aver	*95.6*	*3.6*	*0.5*	*0.3*
10	JRM1	1.424	O1	95.1	4.1	0.7	0.1
			O2	95.0	4.2	0.7	0.1
			R1	95.0	4.2	0.7	0.1
			R2	95.3	4.0	0.6	0.1
			Aver	*95.1*	*4.1*	*0.7*	*0.1*
11	UBP13	1.474	O1	97.2	2.1	0.4	0.2
			O2	96.9	2.2	0.5	0.4
			R1	97.1	2.1	0.5	0.3
			R2	97.2	2.1	0.4	0.3
			Aver	*97.1*	*2.1*	*0.5*	*0.3*
12	UBP14	1.473	O1	95.0	4.1	0.6	0.2
			O2	95.0	4.1	0.6	0.3
			R1	94.9	4.1	0.7	0.4
			R2	94.8	4.2	0.7	0.4
			Aver	*94.9*	*4.1*	*0.6*	*0.3*
13	UBP20	1.417	O1	97.0	2.2	0.4	0.4
			O2	96.9	2.5	0.4	0.1
			R1	97.1	2.3	0.4	0.3
			R2	96.8	2.6	0.4	0.2
			Aver	*96.9*	*2.4*	*0.4*	*0.3*
14	UBP19	1.369	O1	96.0	3.4	0.4	0.2
			O2	94.8	4.6	0.4	0.2
			R1	95.2	4.1	0.4	0.3
			R2	95.2	4.0	0.5	0.3
			Aver	*95.3*	*4.0*	*0.4*	*0.2*
15	UBP23	1.396	O1	97.3	2.0	0.6	0.1
			O2	97.2	2.1	0.6	0.1
			R1	96.7	2.5	0.6	0.1
			R2	97.3	2.0	0.5	0.2
			Aver	*97.1*	*2.2*	*0.6*	*0.1*

Coin No	Collection Ref.	Weight in grams	Analyzed Area	Percent Au	Percent Ag	Percent Cu	Percent Fe
16	UBP17	1.410	O1	97.6	1.9	0.3	0.2
			O2	96.9	2.4	0.2	0.4
			R1	97.6	2.0	0.2	0.2
			R2	97.5	2.1	0.2	0.2
			Aver	*97.4*	*2.1*	*0.2*	*0.3*
17	IAC2	1.391	O1	94.0	5.1	0.8	0.1
			O2	93.7	5.3	0.8	0.2
			R1	93.9	5.3	0.7	0.2
			R2	93.8	5.4	0.7	0.2
			Aver	*93.8*	*5.3*	*0.7*	*0.2*
18	UBP27	1.473	O1	96.5	3.3	0.06	0.1
			O2	96.5	3.4	0.05	0.1
			R1	97.1	2.6	0.06	0.2
			R2	97.4	2.4	0.04	0.1
			Aver	*96.9*	*2.9*	*0.05*	*0.1*
19	UBP21	1.421	O1	98.2	1.4	0.04	0.4
			O2	97.9	1.5	0.03	0.6
			R1	98.2	1.4	0.03	0.3
			R2	98.5	1.2	0.04	0.3
			Aver	*98.2*	*1.4*	*0.03*	*0.4*
20	MNP3	1.308	O1	97.5	1.9	0.4	0.2
			O2	97.3	2.0	0.4	0.3
			R1	97.4	2.0	0.4	0.2
			R2	97.1	2.3	0.5	0.2
			Aver	*97.3*	*2.0*	*0.4*	*0.2*
21	UBP24	1.395	O1	95.4	3.6	0.6	0.4
			O2	95.3	3.7	0.6	0.3
			R1	95.5	3.6	0.5	0.3
			R2	95.7	3.5	0.5	0.3
			Aver	*95.5*	*3.6*	*0.6*	*0.3*
22	UBP15	1.434	O1	95.5	3.5	0.5	0.3
			O2	95.8	3.5	0.5	0.2
			R1	95.8	3.5	0.5	0.2
			R2	95.3	3.8	0.6	0.3
			Aver	*95.6*	*3.6*	*0.5*	*0.3*
23	UBP16	1.394	O1	96.1	3.5	0.2	0.3
			O2	96.0	3.6	0.2	0.3
			R1	94.7	4.6	0.2	0.5
			R2	95.1	4.4	0.2	0.4
			Aver	*95.4*	*4.0*	*0.2*	*0.4*

Coin No	Collection Ref.	Weight in grams	Analyzed Area	Percent Au	Percent Ag	Percent Cu	Percent Fe
24	GM7	1.365	O1	85.6	13.4	0.75	0.3
			O2	85.9	12.9	0.73	0.4
			R1	87.5	11.7	0.73	0.1
			R2	86.5	12.6	0.82	0.1
			Aver	*86.4*	*12.6*	*0.76*	*0.2*

AM = collection of Dr. António Miranda, Santo Tirso
DTA = collection of Mr. Diogo Trigueiros de Aragão, Lisbon
GM = collection of Mr. J. A. P. Godinho Miranda, Lisbon
IAC = Instituto de Arqueologia, Faculdade de Letras, Coimbra
JRM = collection of Mr. José Rodrigues Marinho, Lisbon
MNP = Museu Numismático Português, Imprensa Nacional - Casa da Moeda, E.P., Lisbon
UBP = collection of the União de Bancos Portugueses, S.A., Porto; previously of Mr. Pinto de Magalhães

A NEW COIN LEGEND FOR PRAKĀŚĀDITYA

Gerald M. Browne

Recently a gold dīnāra from a private collection appeared in London.[1] It is a coin of the Gupta king Prakāśāditya, who appears to have ruled in the second half of the fifth century.[2] Beside being in an excellent state of preservation, the coin displays a legend that is without an exact parallel. Its size is 1.8 cm and the weight is 7.51 g.

Obv.: King, wearing cap and coat, riding caparisoned horse r.; bow passes under r. arm, bowstring rests on r. shoulder; lance in r. hand enters lion's mouth and emerges from back of head, as lion falls backward; beneath horse ſ (*ru*); above r. Garuḍa standard (three pellets)[3] followed by circular legend (Sanskrit, Upagīti meter):

ꢬ (legend in Brāhmī script)

[1] Spink 71, 11 Oct. 1989, 1020.

[2] See A. S. Altekar, *The Coinage of the Gupta Empire* (Bombay, 1957), pp. 282–86.

[3] See J. Allan, *Catalogue of the Coins of the Gupta Dynasties and of Śaśanka, King of Gauḍa* (London, 1914), p. ciii (hereafter, Allan).

aprativitato rājā [viji]tya vasudhāṃ divaṃ jayati

- v v|v v -| - - ‖v -   v |v v   - | v|-   v v|-

"Unopposed, the king, having conquered the earth, wins heaven."

Rev.: Lakshmī nimbate, seated facing on lotus, wearing *sārī*, *kañcukī* (bodice), earrings, necklace, armlets, and bracelets; *pāśa* (noose) in outstretched r. hand; lotus in l. resting on thigh; 🟊 to top l., to r. �����:: *Śrī Prakāśāditya*.

Although the tops of the first six *akṣaras* in the obverse inscription are off the flan, the remnants are incompatible with *parahitakārī*, "benefactor of others," which P. L. Gupta and S. Srivastava have read as the beginning of the legend in similar specimens.[4] Previously published coins either do not preserve the first part of the line[5] or have a different text.[6]

Instead of *parahitakārī*, the present specimen appears to have *aprativitato* "unopposed" or "unencroached upon," literally "unextended against." Although the word as a whole is not known to me elsewhere, its components appear in other Gupta coin legends: for *aprati-* cf. *aprati-ratha* "invincible" in the archer-type *dīnāras* of Samudragupta[7] and for *-vitato* note *samara-śata-vitata-vijayo* "having victories extended over a hundred battles" in the standard-type examples of the same

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[4] *Gupta Gold Coins* (Varanasi, 1981), pp. 23 and 83. In the transcription on p. 83 delete [- - - -]: cf. p. 23.

[5] Allan, pp. 135–36, 552–57. Altekar, p. 354, states that regarding the inscription on an American Numismatic Society coin published by P. L. Gupta (*JNSI* 15 [1953], pp. 86–87), "the concluding part does not seem to be *vijitya vasu-dhāṃ divaṃ jayati*." But in the original publication the letters are given as *sadha-davaja* (p. 86), which can be expanded to *va]sudhāṃ divaṃ ja[yati*; I have confirmed this reading on a photograph of the coin kindly provided by Dr. Michael Bates of the A.N.S. It should also be mentioned that where Gupta thought he saw the "truncated part of four or five letters...on the right," comparison with the present specimen shows the three pellets representing the Garuḍa standard followed by faint traces that are not incompatible with ��� .

[6] A coin with the word "Bhānugu(pta)" [thus transcribed] in the first part (i.e. [- - v] *Bhānugu[pto ‖ vijitya* etc.) was published by K. S. Shukla, "A Unique Gold Coin of Bhānugupta and Prakāśāditya," *JNSI* 42 (1980), pp. 120–26.

[7] Allan, p. cix, §130.

king.[8] In terms of palaeography, *aprati-* invites comparison with the *aprati-* on a coin of Samudragupta from the *Bayana Hoard*[9] and its initial *akṣara* is especially close to that at the beginning of the reverse inscription on another of his coins from that hoard.[10] The *-vitata-* of yet a third of his coins[11] is not dissimilar to the writing on the present coin.

[8] Allan, p. cviii, §129. I here record my indebtedness to my colleague, H. H. Hock, who, on the basis of his deep knowledge of Sanskrit, agrees with my interpretation of the form *aprativitato.*

[9] A. S. Altekar, *The Gupta Gold Coins in the Bayana Hoard* (Bombay, 1954), pl. 6, 1, p. 55, 184.

[10] *Bayana Hoard,* pl. 4, 10, p. 44, 163.

[11] *Bayana Hoard,* pl. 2, 5, p. 18, 67.

A DIVANI DATED COIN OF 567 OF THE MANGUCHAKIDS; AND COINS OF 936 (NOT 1036) OF SULAYMĀN THE MAGNIFICENT

(PLATES 8–9)   GARO KURKMAN

A DIVANI DATED COIN OF 567

Sources related to Manguchakid history are very scarce and those available are neither detailed nor comprehensive. Few coins are extant, but one is of particular interest here.

In 463 A.H./A.D. 1071, Seljuk armies moved westward into Anatolia toward the capital of the Byzantine Empire. Alp Arslan, the Seljuk commander, had won a decisive victory against the Byzantine Emperor Romanus IV Diogenes (1067–71) on the plain of Malazgirt (Manzikert). Nine years later Georgian sources mention a mass migration westward and in 1080 three Turkoman chieftains—Ahmed, Bujgob, and Ayas (Iasi)—led their tribes across Anatolia.[1] O. Turan has concluded that the name Bujgob corresponds with Manguchak, the founder of the dynasty.[2] He suggests that Manguchak must have paid allegiance to the Seljuk Sultan Sulayman Shāh (1077–86) although when this relationship began is not clear.

[1] M. Brosset, *Histoire de la Georgie*, vol. 1 (Saint Petersburg, 1879), p. 218.
[2] Osman Turan, *Doğu Anadolu Türk Devletleri Tarihi* [History of the Turkish states in eastern Anatolia] (Istanbul, 1973), p. 57.

The territory of the Manguchakids spread from Erzinjan to Kemah, Divrigi to Koghonia (eastern Karahisar). They were one of the first Turkish dynasties to settle in Anatolia. According to the Syrian historian Michael, after the death of Ishaq Bey (Manguchak's son), the realm was divided between his three sons.[3] The capital, Kemah, went to Malik Maḥmūd, Erzinjan was taken by Da'ūd Shāh, and Divrigi fell to Sulaymān Shāh. There is no evidence that the early Manguchakids struck any coinage. This suggests that they never achieved complete independence and were always under the suzerainty of the Seljuks of Rūm.

The son of Sulaymān, Sayf al-Dīn Shāhanshāh, struck the coin that constitutes the subject of this article, Plate 8, 1 and 2. It is catalogued in four different sources.[4] All four sources have failed to mention that the coin bore a date. Only Max von Berchem mentioned the numeral 500 and he suggested that the coin was struck sometime between 570 and 579 A.H. Using A. Tevid he succeeded in better identifying the coin, but still could not fully read the date.

1. Obv.: (سلطان ا) لمعظم   Rev.: (فخ)رالامرا سيف
     (عزالد نيا و) الدّين   الدين شا هنشا(ه)
     (ا) بو الفتح قلج آ(ر)سلان   بن سليمن بن
     (بن) مسعود نصر   (ا)سحق حسام
     (ا) مير المومنين   (ا)مير المومنين

     (Sulṭān al)-mu'aẓẓam   Fakhr al-umarā' sayf
     ('izz al-dunya w)a' l-din   al-dīn Shāhanshāh
     (a)bū'l Fatḥ Qilij A(r)slān   bin Sulaymān bin
     (bin) Mas'ūd naṣr   (I)shāq ḥusām
     (a)mīr al-mū'minīn   (a)mīr al-mū'minīn

     567; 23–27.5 mm; 7.7 g; C. Ö. 7134; Plate 8, 1

[3] Michaelis Attaliotae, Historia, manuscript.

[4] Ahmed Tevhid, *Meskukat'ı Kadime-i Islamiyye Katalogu* [Catalogue of ancient Islamic coinage], pt. 4 (Istanbul, 1321/1903), p. 522, pl. 7, 100; Max von Berchem, "Matériaux pour un Corpus Inscriptionum Arabicarum," *L'Institut français d'archéologie oriental du Caire* 29 (1910), p. 104; Ibrahim and Cevriye Artuk, *Istanbul Arkeoloji Muzeleri Teshirdecki Islami Sikkelri Katalogu*, vol. 1 (Istanbul, 1970), p. 389, 1192; Michael Mitchener, *The World of Islam* (London, 1977), p. 176, 1012.

2. Obv.:   سلطان المعظم
عزللدنيا و الدين
ابو الفتح قلج ا (رسلان)
(ب)ن مسعود......
ا مير المو منين

Rev.:   . . . .
. . . .
ا نق
بن سليمن بن
ر
(ا)سحق حسام
و
امير المومنين

Sulṭān al-muʻaẓẓam
ʻizz al-dunya wa'l-din
abū'l Fatḥ Qilij A(rslān)
(b)in Masʻūd (naṣr)
amīr al-mū'minīn

. . . .
. . . .
bin Sulaymān bin
(I)shāq ḥusām
amīr al-mū'minīn

56(7); 25–25.5 mm; 7.15 g; Artuk 1192; Plate 8, 2

On the obverse of the coin tribute is paid to the Seljuk Sulṭān ʻIzz al-Dīn Qilich Arslān II (551–88/1156–92). On the reverse the name of the ruler Sayf al-Dīn Shāhanshāh is inscribed as the one who struck the coin. The date appears on the left of the reverse and is unique as far as previous numerical systems used for dating are concerned. The first digit from the right (in the units column) is presented as an Arabic word سبع (sabʻa, seven); the second digit (in the tens column) is presented as a number ٦ (six); and the third digit (in the hundreds column) is presented as a divani numeral (ﻻ, 500).[5] Thus the composition of the date 567 A.H. is revealed through a combination of divani numeral-number-word. This corresponds to the year from September 1171 to August 1172. In Plate 8, 1 سبع (sabʻa, seven) is at the edge of the flan where it is partly obliterated and does not appear in full. The shape of the word is similar to that of the number تسع (tisʻa, nine). However, the Arabic letter bā' is taller than the teeth of the letter sīn. If this word were tisʻa (nine), then the tooth of the tā' would be taller than the teeth of the sīn. Therefore the date is definitely verified as 567/1171.

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[5] Salahaddin Elker, *Divan Rakkamları* [Divani numerals] (Ankara, 1953), pl. 5. Elker shows the numeral 500 as ﻻ, which is slightly different than its predecessor of 817 years ago. I believe that ﻻ inscribed on the coins represents the numeral 500.

This situation also applies to the other two published coins. This copper struck by Sayf al-Dīn Shāhanshāh is the earliest example of incorporating a divani numeral in expressing the date on a coin. Furthermore, based on my research and observations on the Islamic coins struck outside of Anatolia, I know of no coins incorporating a divani numeral which are earlier than this. A document issued in 306 A.H. (918/9) states that the divani numerals were in use during the supremacy of the ʿAbbāsids (132–656/750–1258) but it does not mention coinage.[6] Some authorities have argued that the origin of the divani numerals was in Iran. It seems probable that both the Seljuks of Rum and the Manguchakids were influenced by them. Unfortunately none of their accounting or bookkeeping records have come down to us.[7]

A MANGHIR OF SULAYMAN THE MAGNIFICENT, NOT RŪM MUHAMMAD

A batch of coins was sent to Vienna from Istanbul where, in 1904, Philippe De Saxe-Cobourg started studying them jointly with Professor Karabacek, the Librarian of the Vienna Royal Library.[8] In this batch two coins (see line drawings below) attracted their attention and de Saxe-Cobourg described them as follows:[9]

Obv.:   سلطان روم محمد عزّت

Rev.:   سكه دارالضرب حلب

On the reverse of the coin the numerals 3 and 6 are visible upside down at the top. The second coin does not bear any date. De Saxe-Cobourg interpreted the date as 1036 A.H. and, based on this assumption, read the obverse as Sulṭān Rūm Muḥammad ʿIzzet. The year 1036 fell within the reign of Sulṭān Murad IV (1032–49 A.H./A.D.

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[6] Cerci Zeydan, *Medeniyyet-i Islamiyye Tarihi* [History of Islamic civilization], vol. 2, trans. Zeki Megamez (Istanbul, 1912-13), p. 120.

[7] Dündar Günday, *Arşiv Belgelerinde Siyakat Yazısı Özellikleri ve Divan Rakkamları* [Characteristics of the siyakat alphabet on archive documents and divani numerals] (Ankara, 1974), p. 1, states that the introduction of divani numerals into Anatolia occurred in the last years of the eleventh century A.D.

[8] Philippe De Saxe-Cobourg, "Deux Monnais inconnus de rebelle Rum Muhammad (1626/7)," *RBN* 60 (1904), p. 156.

[9] The drawing of both coins appears in De Saxe-Cobourg's article.

1623–40 and De Saxe-Cobourg accepted the coins as an issue of the rebel Rūm Muḥammad struck in Halab.

My research on this subject[10] suggests that two of the four words on the obverse were misread. The third word is عجم, *ajem*, not محمد, Muḥammad. The first letter is ع, *'ain*, and the engraver closed the small hook on the top of the letter, transforming it to a loop and making it a م, mim. Comparing coins 3, 7, 8, 9, and 10 (see Plate 9), *'ain* is distinctly visible. Furthermore, the last letter of the word *'ajem* has been given an upturned tail which caused De Saxe-Cobourg to read the *dal* of Muhammad.

The word on the bottom line was also misread. The word 'Arab was read as 'Izzet. Actually this is due to incorrect punctuation. Often the points of the Arabic letters are incorrectly placed and sometimes they are completely omitted. The obverse inscription thus reads Sulṭān Rūm 'Ajem 'Arab, or the Sulṭān of Anatolia, the Persians, the Arabs.[11] The reading of the reverse inscription is correct.

The numerals appearing between the lobes of the hexafoil, as stated above, are 3 and 6 to which, motivated by the Rūm Muḥammad idea, De Saxe-Cobourg add 1 and 0 to obtain the date 1036 A.H. He correlated this with the incorrectly read obverse of Rūm Muḥammad to read the wrong conclusion and the wrong period. Actually, there are two types of coins like this, dated and undated.

The dated hexafoil coins bear the date between the petals of the hexafoil (3, 7, and 8). On coin 3 the date 936 can be observed. The straight line of the number 9, ٩, is cut short causing the number to look like ٥, 5, or 536 A.H. this is incorrect. A) During the period, ca. 536/1142, this kind of copper coin was not struck in the district of Halab. B) At this time (the sixth century A.H.), dates on Arabic coins were given in words and not in numbers. Numerals did not come into use until the seventh century. Arabic numerals on Muslim coinage came

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[10] I have examined over 25 manghirs of this type.

[11] In the medieval period Anatolia was referred to as Diyar-i Rum, the land of Rome. In the early Ottoman period, the area of Qonya was called the Greek province. This term is found on a stone carving dated 594/1198 from the time of Mas'ūd, the Melik of Ankara (Mubarek Galip, *Ankara Kitabeleri* [Istanbul, 1341/1922], vol. 1, p. 47).

into general use in the beginning of the ninth century. Unfortunately I could not find a specimen with a better obverse inscription displaying the date in full (cf. Plate 9, 7-10).

In the collection of the American Numismatic Society is a manghir of the type discussed above which has been overstruck, Plate 9, 4, and Fig. 4, cf. Figs. 5 and 6. Coins 5 and 6 do not give the name of the sultan but the date is clearly 938. Halab at this date was within the boundaries of the Ottoman Empire, and this coin belongs to the era of Sulaymān the Magnificent, 926–74/1520–66. The lack of the sulṭān's name on the coin is worth further investigation/consideration.

The obverses of the undated coins are the same as those that are dated. The reverses are similar too, except that the areas between the lobes where the numerals of the dated coins are inscribed are replaced by three dots. In coin 10 the ب, bā', of ḍuriba is placed between the words sikke' and ḍuri. These coins are rare. The few I have seen are usually clipped on the spots where the date would have appeared and consequently it is uncertain whether they are of the dated or the undated variety.

1–2. De Saxe-Cobourg illustrations
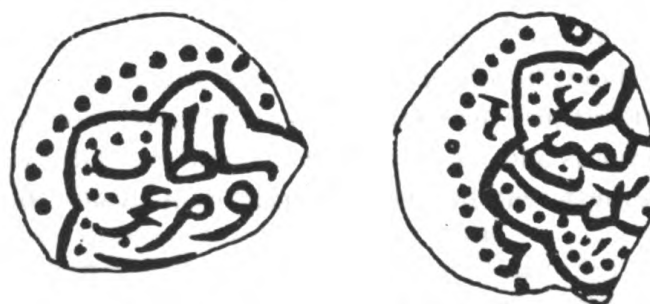
3. Obv.: سلطان Sulṭān   Rev.: سكه Sikke'

روم عجم rūm 'ajem   دارالضرب dār al-ẓarb

عرب 'arab   حلب Ḥalab

936; 15–17 mm.; 2.49 g.; C. Ölcer 6672; Plate 9, 3

4. [938]; 17.5–19 mm.; 3.72 g.; A.N.S. 999.19888; Plate 9, 4.

5. Obv.: سلطان عدله و طول عمره   Rev.: ٩٣٨ ضرب فلس حلب
   Sulṭān ʿadale wa ṭuwl ʿamrahu   Ḍuriba fulūs Ḥalab 938

938; 18 mm.; 2.70 g.; N. Kabaklarli, 10–Hlb–49.

6. Obv.: See 5   Rev.: See 5

938; 17 mm.; 2.58 g.; N. Kabaklarli, 10–Hlb–53.

7. Obv.: See 3   Rev.: See 3

[9]36; 16–18 mm.; 2.37 g.; A.N.S. 1936.999.162; Plate 9, 7.
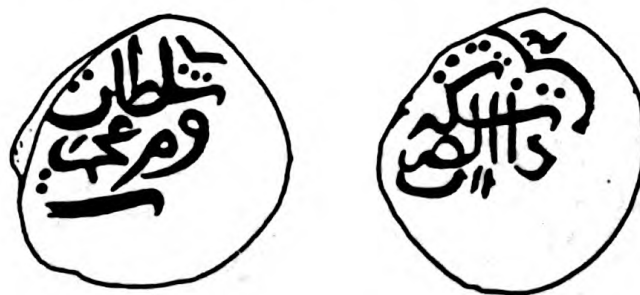
8. Obv.: See 3   Rev.: See 3

[9]3[6]; 15.9–17.7 mm.; 2.15 g.; G. Kurkman 207; Plate 9, 8.
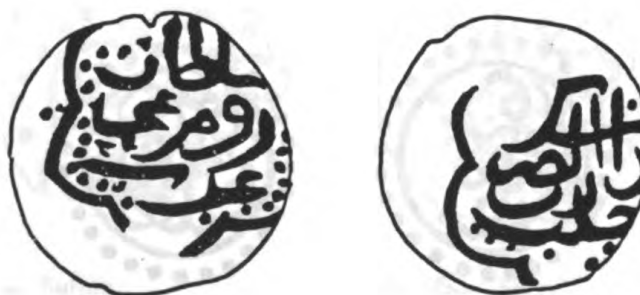
9. Obv.: See 3   Rev.: See 3

[936]; 17.4–18.2 mm.; 2.52 g.; G. Kurkman 208; Plate 9, 9.

10. Obv.: See 3   Rev.: See 3

N.d.; 16.2–17 mm.; 2.24 g.; G. Kurkman 209; Plate 9, 10.

VARRONE D'AGNIOLO BELFERDINO'S COMMEMORATIVE MEDAL OF AN UNKNOWN LADY

(PLATES 10–12)   LOUIS WALDMAN

On the inside face of the left door of the central portal of St. Peter's in Rome is a group portrait of the workshop that produced the monumental bronze doors (Plate 10, 1). The relief shows the master of the workshop, Antonio Averlino, called Filarete, leading his assistants in a joyful dance. An accompanying inscription identifies the group as "Antonius et discipuli mei," and the individual assistants are each identified by inscriptions at their feet. Directly behind Filarete is "Varrus Florentie," who can be identified with one of the more interesting and enigmatic artists in mid-fifteenth century Rome, Varrone d'Agniolo Belferdino. That Varrone occupies pride of place among the assistants on the relief is certainly not without significance. His work in bronze, including a set of gates for Castel Sant'Angelo, indicates that he was an accomplished foundry man, and he must have played a major role in the production of the St. Peter's doors. Few of Filarete's assistants are more fully documented than Varrus, or Varrone as he is generally called in the surviving records. Thanks to the researches of Adamo Rossi and Eugène Müntz in the Vatican Archives we know of a wide variety of projects on which he was employed by the papacy in the 1450s.[1] Recently, the discovery and publication of a signed medal of

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[1] Adamo Rossi, "Spogli vaticani," *Giornale di Erudizione Artistica* 6 (1877), pp. 221–22 (hereafter, Rossi); Eugène Müntz, *Les arts à la cour des papes pendant le*

the Emperor Claudius has provided the first indisputable visual evidence concerning Varrone's artistic personality.

The name of Varrone (alternately spelled Varone, Verrone, Verone) d'Agniolo Belferdino (or Belferdeli, as it sometimes appears) is mentioned frequently in the payment registers of the Vatican *Tesoreria Secreta* in the third quarter of the fifteenth century. Gaetano Milanesi has written that Varrone's real Christian name was Beltrame or Beltramone, although his source for this statement is unknown; it does not appear as such in published documents.[2] The date of 1420 given by

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xve et le xvie siècle; Recueil des documents inédits tirés des archives et des bibliothèques romaines, ed. Ernest Thorin, 3 vols. (Paris, 1876–82) (hereafter, Müntz).

[2] Giorgio Vasari, *Le vite de' più eccellenti pittori scultori ed architettori*, ed. Gaetano Milanesi (Florence, 1876), vol. 2, p. 462, n. 1 (hereafter, Milanesi/Vasari). Milanesi cites Adamo Rossi's "Spogli vaticani" as the origin of his information about Varrone, although neither Rossi nor Müntz contains any indication that Varrone's real name was Beltrame or Beltramone. Müntz does propose that Varrone might be a humanistic pseudonym (vol. 1, p. 88, n. 1), although it seems that his reason for this conjecture was merely that Varrone was an uncommon given name in early quattrocento Florence. Since it is not possible at present to trace Milanesi's assertion, we must question it. In the records of the *Tesoreria Secreta* the name of Varrone often appears in proximity to that of another stonemason and contractor employed by the Vatican under Nicholas V, Beltrame (or Beltramo) di Martino da Varese (Müntz, pp. 104, 109–10, 121–24, 148–50, 157–59, and 162). This Beltrame repaired walls at Ripa Romea along the Tiber in 1450, in June 1451 he and his assistants were involved in the construction of the *rocca* of Orvieto, and from August of that year through the end of 1453 he took part in the restoration of the Porta Portuensis. In addition, from June 1452 through November 1453 he was employed on the construction of the *tribuna* of Old St. Peter's and of the chapel of the Madonna delle Febbre nearby. Since Varrone and Beltrame appear in essentially the same capacity in the payment records (both, for instance, fabricated marble windows for the basilica), and since the name Varrone has a pseudonymous ring, Milanesi may have confused the two artisans, or he may have assumed incorrectly that Varrone was a pseudonym of Beltrame's. Beltrame di Martino had a nephew, Pietro di Giovanni di Martino da Viconago, who built Nicholas V's tower behind the Capitol (Müntz, vol. 1, pp. 148–50) and later was employed on the triumphal arch of Alfonso I, C. von Fabriczy, "Der Triumphbogen Alfonsos I am Castel Nuovo zu Neapel," *Jahrbuch der Königlich Preussischen Kunstsammlungen* 20 (1899), pp. 10 and 152. Incidentally, there are two separate articles on Varrone d'Agniolo in Thieme-Becker, *Allgemeines Lexikon der Bildenden Künstler von der Antike bis zur Gegenwart* (Leipzig, 1907–50): *s.v.* "Belferdino, Maestro Varrone," vol. 3, p. 223, and *s.v.* "Varro(ne)," vol. 34, p. 118.

Milanesi for Varrone's birth is a guess based on the approximate age at which he would have entered Filarete's workshop and on his appearance on the 1445 relief on the doors of St. Peter's. He is first documented through payment records of the *Tesoreria* in 1450 although his presence in the workshop indicates that he was working in Rome at least as early as 1445. In the former year (January 10), Varrone received a payment for some marble windows in Old St. Peter's.[3] Subsequently he was paid for seven more windows there and the surrounding masonry work.[4] On March 20 he was paid for two marble window frames in the Vatican palace, in the *sala nuova* towards the vineyard.[5] Later in 1450 he received six ducats for restoring the pavement in the small chapel of the palace, and payments continued in connection with that project until June 10, 1451.[6] On that day Varrone was also disbursed three ducats for a stone slab for the tomb of one Cholino di Liodio.[7] From late in 1453 to February 1454 he appears as the *maestro* in charge of the restoration of the lead roof of Santa Maria Rotonda,[8] and in 1454 he made or restored the bronze gates of Castel Sant'Angelo.[9] In 1457 we find the last documentary reference to Varrone, who was engaged upon the production of some unspecified decorative work at Ponte Molle.[10] In book 7 of his *Trattato di architettura*, written between 1461 and 1464,

[3] Rossi, p. 221; Müntz, vol. 1, p. 121.
[4] Müntz, vol. 1, p. 122.
[5] Rossi, p. 221; Müntz, vol. 1, pp. 116 and 122.
[6] Müntz, vol. 1, p. 116.
[7] Müntz, vol. 1, p. 88, n. 6.
[8] Rossi, p. 221; Müntz, vol. 1, p. 145.
[9] These gates have been identified as those of the Porta di S. Pietro all'Adrianeo, famous throughout the later Middle Ages as the Porta Aenea when they served as the chief entry to the city. The medieval gates are thought to have been erected during the ninth-century reconstruction of the city under Pope Leo IV. Whether Varrone replaced those completely or merely renovated them is not certain. Rossi, p. 221; Müntz, vol. 1, p. 153; Umberto Gnoli, *Topografia e toponomastica di Roma medioevale e moderna* (Rome [1939]), p. 236; Cesare D'Onofrio, *Castel S. Angelo e Borgo tra Roma e Papato*, Studi e testi per la storia della città di Roma 1 (Rome, 1978), pp. 143–46, 179, and 255.
[10] Rossi, p. 221; Müntz, vol. 1, p. 195. Müntz assumed that Varrone was probably responsible for the coats of arms of Pope Callixtus immured at Ponte Molle.

Filarete mentions his former pupil among the artists he planned to employ in his imaginary city of Sforzinda.[11] After naming Donatello, Luca della Robbia, Agostino di Duccio (and his brother), Desiderio da Settignano, Mino da Fiesole, Michelozzo, Pagno di Lapo Portigiani, Bernardo Rossellino, Lorenzo Ghiberti, his son Vittorio, and Masaccio, he adds: "I sent for two who had been to study with me in Rome; one was called Varrone, the other Niccolò...."[12]

Vasari, in his rather untrustworthy biography of Filarete, states that Varrone was responsible for a number of important commissions in Rome under Pius II, working in collaboration with the same Niccolò mentioned in the *Trattato di architettura*.[13] To them Vasari attributed the marble statue of St. Andrew erected near Ponte Molle to celebrate the translation of the saint's head to Rome. That work, however, is known through payment documents to be a work of Paolo Romano dating from 1463.[14] Vasari also names Varrone and Niccolò as the sculptors of the marble decoration of the tabernacle in which Andrew's relic was placed in Old St. Peter's; yet all documented payments for this monument (March 1463-August 1464) are to the sculptors Paolo Romano and Isaia da Pisa.[15] If Varrone and Niccolò did actually work on the tabernacle, as Vasari claims, then they must have been in the

[11] On the work's date of composition, see John R. Spencer, "La datazione del Trattato del Filarete desunta del suo esame interno," *Rivista d'arte* 31 (1956), pp. 93–103.

[12] Antonio Averlino, called il Filarete, *Trattato di architettura*, Trattati di Architettura 2, eds. Anna Maria Finoli and Liliana Grassi, 2 vols. (Milan, 1972), vol. 1, p. 171.

[13] Milanesi/Vasari, vol. 2, p. 462. Milanesi identifies this Niccolò as Niccolò Baroncelli da Firenze. Hugo von Tschudi ("Filarete's Mitarbeiter an den Bronzethüren von St. Peter," *Repertorium für Kunstwissenschaft* 7 [1884], pp. 293–94) has suggested that since Niccolò was not represented on the St. Peter's plaque, he may have entered Filarete's workshop only later, that is between the completion of the doors in 1445 and the master's banishment from Rome in 1447.

[14] Müntz, vol. 1, pp. 248–49 and 262–63. Identified with the statue that survives in the Pilgrims' Cemetery at Ponte Molle, A. Venturi, *Storia dell'Arte italiana, VI: La scultura del quattrocento* (Milan, 1908), p. 1116. Müntz's theory (vol. 1, p. 249, n. 1) that Vasari erroneously attributed the St. Andrew statue to Varrone out of confusion between it and the artist's documented work at Ponte Molle seems plausible.

[15] Müntz, vol. 1, pp. 249 and 285–89; A. Bertolotti, "Urkundliche Beiträge zur Biographie des Bildhauers Paolo di Mariano," *Repertorium für Kunstwissenschaft* 4 (1881), p. 431.

employ of Paolo and Isaia.[16] Vasari also states that Pius employed them in his building projects at Tivoli.[17]

Although Varrone's last documented activity, the decorative work at Ponte Molle, dates from 1457, Milanesi's assumption that he must have died around that year is without foundation.[18] He may simply have ceased working for the papacy. On the other hand, although Filarete's treatise was composed around 1461–64, there is no certainty that Varrone was actually alive at that time, as Valentiner has claimed.[19] By that date the writer had been absent from Rome for a decade and a half, and it would hardly be surprising if he had lost contact with his former assistant.

Despite the existence of considerable information concerning Varrone's activities, as an artist he only existed on paper until the recent publication of a signed bronze medal representing the Emperor Claudius (Plate 10, 2).[20] The discovery of this work reveals that

[16] The *ornamento di marmo che è sopra le colonne della cappella* mentioned by Vasari has been identified with the St. Andrew reliefs now in the Grotte Vaticane, Venturi (above, n. 14), vol. 6, pp. 1115–16, 1119, and figs. 761–62. An attempt to attribute one of these to Varrone has been made by W. R. Valentiner, "The Florentine Master of the Tomb of Pope Pius II," *The Art Quarterly* 21, 2 (1958), pp. 117–50. Valentiner also assigns to Varro the six niche statues of virtues on the tomb of Pius II in S. Andrea della Valle (formerly in Old St. Peter's), the four statues of virtues on the tomb of Cardinal Astorgio Agnensi in Santa Maria sopra Minerva, a tabernacle dated 1469 in S. Gregorio, the tomb of Cardinal de Lebretto in Santa Maria in Aracoeli, and the memorial tablet of St. Nicholas of Cusa in S. Pietro in Vincoli (the last two dated 1465); however, none of Valentiner's attributions to Varrone is supported by any very significant evidence.

[17] Milanesi/Vasari, vol. 2, p. 462: "...e per ordine del medesimo [Pius II] restaurarono Tigoli [*sic*] quasi dai fondamenti...."

[18] Milanesi/Vasari, vol. 2, p. 462, n. 1.

[19] Valentiner (above, n. 16), p. 149.

[20] Bronze, diameter 93 mm. The medal was unknown before it came up at auction in London and was sold to a dealer in the same city, whence it was acquired by the National Gallery of Art in Washington, Sotheby's, 23–24 May 1988, 6. The piece was first studied in John R. Spencer, "An Unknown Fifteenth Century Medallist: Varro, Beltrame Belfradelli," *The Medal* 13 (1988), pp. 4–7. I am grateful to Douglas Lewis and Don Myers of the National Gallery and to Tom Eden of the Coin Department at Sotheby's for kindly supplying photographs and information concerning this medal.

Varrone was a sculptor of notable originality. The obverse displays a bust portrait of Claudius laureate, facing left, and wearing the paludamentum. In the field, on either side of the bust, appear the letters S and C, the mark of senatorial authorization that appeared on Roman coinage. Around the edge the legend reads CLAVDIVS•DRVSI•AVGX•PON•MAX•TRE•POT•DIVVS•VAPRVS•PITTOR [the crossbars of the double T linked] •F•. Below the P of VAPRVS the vestige of a leg is faintly visible, indicating that the inscription was intended to read *Varrus pittor f[ecit]*.[21] In creating his Claudius bust Varrone may have employed the same numismatic prototype Filarete had used for his St. Peter's doors, since among the medallion reliefs in the borders of the doors there appears the head of a previously unidentified emperor (Plate 10, 3), closely corresponding to Varrone's portrait of Claudius. It is also possible, given the strongly idiosyncratic treatment of Filarete's Claudius portrait, that the latter instead served as Varrone's model.[22] On the reverse of the Claudius medal appears a scene derived from the reverse type of a group of *congiarium* sesterii (type D1) issued by Nero beginning in A.D. 57 (Plate 10, 4).[23] The seated emperor, on a stepped dais together with standing figures of Minerva and Liberalitas (the latter mistaken for Libertas in the medal's legend), presides as an

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[21] It is probable that when the original of the medal was sculpted the letters were carved in a layer of wax which was affixed to the base forming the flan, and during casting part of the first R of VARRVS became detached and fell off. The method of carving letters in a top layer of wax (which was probably stained a different color from the wax of the flan) has been proposed by Spencer in his practical investigations of the technique of carving letters on medals, John R. Spencer, "Filarete, the Medallist of the Roman Emperors," *The Art Bulletin* 61 (1979), pp. 550–61, esp. appendix 2, pp. 559–61.

[22] The Claudius roundel, on the left border of the right valve, is considered on stylistic grounds to belong to one of the earliest sections of the border decoration on the doors: John R. Spencer, "Filarete's Bronze Doors at St. Peter's: A Cooperative Project with Complications of Chronology and Technique," *Collaboration in Italian Renaissance Art*, eds. Wendy Stedman Sheard and John T. Paoletti (New Haven, 1978), pp. 33–57, esp. p. 42. Although the exact chronology of the 12 years' work on the project cannot be determined, a dating in the early 1440s seems plausible.

[23] Richard Brilliant, *Gesture and Rank in Roman Art: The Use of Gestures to Denote Status in Roman Sculpture and Coinage*, Memoirs of the Connecticut Academy of Arts and Sciences 14 (1963), pp. 76–77; *BMCRE* Nero 138, pl. 42, 1.

attendant dispenses largesse to a Roman citizen accompanied by a child. The legend around the edge reads **LIBERTAS•AGVSTA**, which echoes the inscription found on later variations of the same type on Roman coinage, but does not appear on the Neronic sesterii.[24] In the exergue the letters **S** and **C** appear again, flanking a tiny male head facing left (Plate 10, 5). This diminutive portrait is elaborately finished, and in spite of its tiny scale the features are well defined and individualized. The bust is not laureate, and it does not seem to correspond to any Imperial portraits found on coins; but a comparison with the portrait of Varrone on the St. Peter's doors suggests that it may possibly be a self-portrait of the medalist.[25]

In its rough classicism Varrone's work reflects the influence of Filarete; at the same time, even from this one work, it is clear that he possessed a unique and vigorous style quite different from that of the older master. While Filarete's figures generally have extremely squat proportions, Varrone's are elongated to a considerable degree. Varrone's individualism is most fully apparent in the boldness and freedom of his "painterly" handling of the medallic relief. Everywhere the marks of the sculptor's tools are left in the pliant wax, conveying a sense of fluid energy. It would be difficult to name another fifteenth-century medalist whose work retains such an spontaneous, sketchlike quality.

These same characteristics of style are visible on an unsigned medal commemorating the death of an unknown lady (Plate 11, 6) which exists in a unique example in the Dutuit Collection at the Musée du Petit Palais in Paris.[26] The possibility that this medal could also be by

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[24] The legend **LIBERALITAS AVG[VSTA]** occurs with a variant of the scene, which differs formally from the version used by Varrone, on coins of Hadrian (*BMCRE* Hadrian 1136, pl. 77, 4, and 1189, pl. 78, 12.

[25] Both Filarete's Varrone and the little portrait bust share the same high forehead, with square profile, heavy brows, steep jawline, and fleshy mouth; their ages seem approximately identical; and from beneath Varrone's cap it is just possible to see that he had the sort of straight, feathery hair as the subject of the tiny bust in the medal's exergue.

[26] Bronze, diameter 90 mm, holed; accession no. O DUT. 1377. See Alfred Armand, *Les médailleurs italiens des XVᵉ et XVIᵉ siècles*, 2nd ed., 3 vols. (Paris, 1883–87), vol. 2, p. 130, 17 (as Venetian, first quarter of sixteenth century); George

Varrone was tentatively proposed by Spencer.[27] The purpose of the following notes is to examine this attribution in detail and to discuss the medal's iconography.

The obverse of the memorial medal displays the bust portrait of a woman facing right, wearing a veil which covers a formal coiffure and falls in swaths about her shoulders. The veil is gathered at her breast, whence it swells out again and extends to the bottom of the bust. The drapery of the bust is treated in much the same way as on Varrone's Claudius medal and the placement of the portraits within the circular space is similar. The portraits themselves reveal a close stylistic relationship (Plate 11, 7). Both have unusually long and narrow proportions and a similar profile, with a high, slightly curving forehead leading to a slender nose with delicately modeled nostril. Below the nose the lips are less clearly defined, almost cigar-shaped. The chins of the two portraits are rounded and firm, and the muscles of the neck, the sternomastoid (and on Claudius the stylo-hyoid which extends from behind the earlobe to above the larynx) are clearly and carefully delineated. Perhaps the most compelling resemblances are to be found in the area of the eyes: the shape of the eye itself, its proportions, and the plasticity of its lids, the incised pupil, and the careful modeling of the bony structure of the eye socket, brow, and cheekbone are all so nearly identical that it seems almost impossible to doubt that both portraits are the work of the same hand.

Francis Hill, *A Corpus of Italian Medals of the Renaissance before Cellini*, 2 vols. (London, 1930), 1147, pl. 19. A specimen formerly in the Borghesi collection, Raffaele Dura, 24 Apr. 1880 (Borghesi), 393, was believed by Hill to be possibly identical with the Dutuit example. This is confirmed by an interleaved copy of the Dura catalogue formerly belonging to the Munich numismatist Jacob Hirsch (New York, Institute of Fine Arts Library, classmark CJ 5513.B5). Opposite the entry for the piece is Hirsch's penciled notation reading "Dutuy" [*sic*] followed by the price paid, 1700 [lire]. An annotated copy of the catalogue in the library of the American Numismatic Society confirms the price but does not give the names of the buyers. The engraving of the medal in the Dura catalogue has the same hole and casting flaws as the Dutuit specimen. The Curator of the Musée du Petit Palais, Dominique Morel, kindly made photographs of the medal available to me.

[27] Spencer (above, n. 20), p. 7, n. 10.

The medal's reverse depicts a female figure veiled like the portrait on the obverse. She wears a long flowing gown gathered at the waist recalling those worn by the allegorical figures on the medal of Claudius. The cloak of the figure on the memorial medal hangs down almost to her feet; and with her right hand she clasps the brooch which fastens it at her breast. She stands with one foot upon a rock, and the other on a long, slinky beast which appears to be an ermine. In her left hand she holds a cornucopia decorated *all'antica* with acanthus loops and filled with several large stalks of wheat. Her proportions are long and attenuated, and her body curves gracefully like the figures on the Claudius medal. Her drapery, like theirs, is carved out of the wax in bold, powerful strokes. She has Varrone's typical wide eyes with sharply defined lids and the thick, inflated lips seen even on the tiny bust in the exergue of the Claudius medal. The overall modeling displays a rough, chiseled quality recalling the signed medal, though it does not go quite as far in the bold freedom of its handling.

Apart from the numerous stylistic parallels between the two medals, the presence of a single hand is apparent in their epigraphy. As the Claudius medal demonstrates, lettering was not Varrone's greatest strength, and the letters on the commemorative medal are heavily nicked and flawed. However, the basic form of each character is always discernable, and the lettering on the two medals is remarkably consistent. In Plates 11–12, 8, one can compare the forms of all the individual letters which the two medals have in common (except I and L which may be compared in Plates 10–11, 2 and 6). The example of each character on the left is from the Claudius medal that on the right from the commemorative medal. In both cases the individual letters are monumental sans serif capitals. The lines of which they are composed show almost no variation in thickness, although they do not have the precisely drawn outlines that characterize the lettering of medalists like Pisanello, Matteo de Pasti, and Sperandio. Specially to be noted on both medals are the B with its smaller upper story resting upon the curved edge of the lower half; the broad, squat C with a slight downward incline of its lower arm; the shallow descent of the M and its tapering legs; the curved crossbar of the N; the stubby legs holding up the R's heavy bulb; and the wedge-shaped limbs which join to make the V. The letter S presents particular difficulties, as anyone who has ever

tried to draw it in outline knows; Varrone's top-heavy rendition of that character demonstrates a common failing. In fact, when the form of a particular letter encloses open space, Varrone tends to make it plump and round on account of the thickness of his line; but, oddly, when a character has a transversal, like E, F, or L, Varrone draws the crossbar incongruously short—a mannerism that appears rather infrequently in the epigraphy of fifteenth-century medalists. There is little attempt to impose uniform proportions upon his letters; instead, the shape of a character determines its proportions, and this combination of dumpy square letters with compressed, slender characters gives Varrone's inscriptions a peculiarly idiosyncratic and unstudied appearance, corresponding to the casual finish of his medals' sculptural relief.

The epigraphic similarities between the two medals extends to the placement of the letters as well. These tend to deviate more or less considerably from their precise axis in relation to the center of the medal; the word LIBERTAS on the Claudius reverse has wandered completely out of its orbit around the edge of the piece. Vestiges remain on the reverse of the Claudius medal of the incised double compass rule which is still intact on the obverse and on both faces of the commemorative medal; yet the impetuous Varrone seems to have been but little guided by its presence.

Spencer, comparing Varrone's Claudius to the emperor roundels on the St. Peter's doors, on which Varrone collaborated, considered the medal more advanced in style and technique and assigned it a date of 1450 or somewhat later.[28] Given the more conservative style and less assured casting of the memorial medal, it could be earlier than the Claudius medal. A date in the late 1440s seems plausible, perhaps shortly after Varrone left the Filarete shop and began casting bronze as an independent master.

The inscriptions on the memorial medal provide a key to the interpretation of its enigmatic imagery. Around the obverse we read: •MEIPAM •RESPICE•ET•FORMAM•HABEBIS•VIVE•ET•VALE•ET•PEN•MEMOR•ESTO• Hill correctly expanded the first word to *meipsam* but he was uncertain of the meaning of the abbreviation PEN, and he suggested *penitus*

[28] Spencer (above, n. 20), p. 6.

("deeply") as a possible expansion. But the placement of the abbreviation sign over the letter E suggests that at least some of the missing letters probably were meant immediately to follow that character. A probable expansion of the word would be *perenne*, suggesting that the departed will continue to live through the everlasting memory of those left behind. The legend would then translate as "Reflect upon me and you will possess beauty; live, and be well, and always remember [me]." The reverse legend continues in this strain with a consolatory thought adapted from 2 Corinthians 5:17, •RECEDANT•VETERA•ET•NOVA• FACTA•SVNT•OĪA• (OĪA = omnia), "Let the old things fall away; and all things are made anew."[29] The two inscriptions make it clear that the medal was intended to perpetuate the memory of the virtuous lady depicted on its obverse (and, perhaps, symbolically on its reverse). While her portrait preserves the image of her beauty (to which its legend makes reference), the emblematic image on the reverse, alluding to the feminine virtues of constancy (the rock) and chastity (the ermine) illustrates her virtue (frequently cited in the Renaissance as the spiritual counterpart of physical beauty).[30] At the same time, the cornucopia, as a symbol of hope, seems to reiterate the promise expressed by the reverse legend, and the wheat it contains evokes the assurance of eternal life conveyed by the Eucharist.[31] The careful interweaving of word and image on the medal suggests that it was designed by a person of considerable subtlety, whose identity, however, we may never know. Nor can we identify the sitter whose untimely death occasioned the work. Yet Varrone's medal bears out the truth of its humanistic

[29] The Biblical text reads: "Si qua ergo in Christo nova creatura, vetera transierunt: ecce facta sunt omnia nova." The awkward transition from the subjunctive to the indicative mood in the medal's legend must be due to carelessness on the part of the medalist or the designer of the emblem.

[30] For the symbolism of the rock and the ermine, see Guy de Tervarent, *Attributs et symboles dans l'art profane, 1450–1600*, Travaux d'Humanisme et Renaissance 29, 3 vols. (Geneva, 1958–64), vol. 2, cols. 212–14 and 323. The ermine as a symbol of purity derived from the belief that the creature would die if it became soiled. The great popularity of the symbol was spread by its prominence in Petrarch's *Trionfi*. Hill's suggestion that the ermine on Varrone's medal relates it to the Order of the Ermine founded by Ferdinand I of Aragon in 1465 seems unlikely.

[31] Tervarent (above, n. 30), vol. 1, cols. 116–22, especially 119.

message: for in reflecting on the beauty of its workmanship we are reminded of an individual who was considered beautiful both in body and soul, and although her name has been lost, her image lives on in the compelling form given to it by Varrone d'Agniolo Belferdino.

KEY TO THE PLATES

1. Filarete, Bronze Doors, St. Peter's, Rome. Relief on inside of left valve showing the artist and his assistants (detail).
2. Varrone d'Agniolo Belferdino, Claudius. Washington, National Gallery of Art.
3. Filarete, Bronze Doors, St. Peter's, Rome. Detail showing head from borders of right valve (here identified as Claudius).
4. Neronic congiarium sesterius, ca. A.D. 57 (reverse).
5. Varrone d'Agniolo Belferdino, Claudius (detail of reverse).
6. Varrone d'Agniolo Belferdino, Commemorative Medal of an Unknown Lady, Paris, Musée du Petit Palais, Dutuit Collection.
7. Comparison of the treatment of facial anatomy in the Commemorative Medal and Varrone's Claudius.
8. Comparison of the epigraphy of Varrone's Claudius (left) with that of the Commemorative Medal (right).

THE COBS OF CARTAGENA, 1622–1655

(Plates 13–14)   Joseph R. Lasser

When Alonso Turillo de Yebra purchased the office of Treasurer and Proprietor of the Casa de Moneda del Nuevo Reino from Philip III, he was granted the right to organize a complete mint in Santa Fe and a subsidiary mint or oficina in Cartagena. Gold, silver, and billon coins were to be produced in Santa Fe and apparently only small silver and billon coins were authorized for Cartagena; however, there is extensive evidence that Cartagena minted a complete range of Colombian cobs—gold, large and small denomination silver pieces, and billon coins. Strong evidence is provided in Juan Friede's publication of 89 royal, official colonial, and other papers dated 1614–35 relating to the Casa de Moneda of Nuevo Reino prior to its inception and during its early years.[1] Many of these documents comment on the production of coins in Cartagena, order officials to change the metallic composition of the coins minted in that city, or demand the recall of coins made in Cartagena and criticize production by the mint. Among the most significant is a complaint addressed to Philip IV by the Audiencia of Santa Fe dated June 29, 1629, in which the Audiencia asks the king to "prohibit their striking (in Cartagena) any more gold and silver coinage" and states that the treasurer of the city says "that in Cartagena they exceeded their authority by having made 8, 4 and 2

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[1] Juan Friede, *Documentos sobre la fundacion di la Casa de Moneda en Santa Fe de Bogota* (Bogota, 1963).

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reales and a large quantity of 2 and 1 escudos." The protest also notes that high denomination coins should not be struck in Cartagena because "it is not a well developed mint as it does not have all the functionaries to be watchful of possible fraud nor the usual inspection teams."[2]

A. M. Barriga Villalba summarizes the mint's production under the first five treasurers of Nuevo Reino and says that the first one, Alonso Turrillo de Yebra, produced silver cobs "en Cartagena" valued at 1,219,559 pesos.[3] He goes on to say that Turrillo's gold coin production at Cartagena was worth 3,432,504 pesos[4] (214,531.5 escudos) and later says the value of the 1626 coinage was 136,864 pesos (8,554 escudos) and that of 1627 was 2,055,640 pesos (128,477.5 escudos).[5]

A blind radiation-analysis test of silver cobs of Colombia by Adon Gordus of the University of Michigan in 1988 disclosed major differences in the trace elements of the silver coins from Santa Fe compared with those assumed to be from Cartagena. Nine coins were submitted for testing to the laboratory, five from Santa Fe and four that, it was hypothesized, came from Cartagena. The four coins which were believed to have come from Cartagena had an average of 50 times more trace elements of gold in their metallic composition compared with the five pieces known to be from Santa Fe. Mathematically, the odds are in excess of 300 to 1 that the results identify coins from two separate sources.

Analysis of annual production data strengthens the premise that two mints operated in Nuevo Reino only during the early and mid–1600s and that the second mint was active during years of extraordinarily high output. Two short periods, 1627-33 and 1653-55, account for 37 percent of all the silver struck during the years 1622 to 1748 when silver cobs were produced. In addition, during these two peak periods there were two distinctly different types of silver coin designs, strongly indicating two separate sources of manufacture. In the earlier peak period, there were also two clearly different styles of gold coins, again suggesting different places of manufacture.

[2] Friede (above, n. 1).
[3] A. M. Barriga Villalba, *Historia del la Casa de Moneda*, 3 vols. (Bogota, 1969), vol. 1, p. 140.
[4] Barriga Villalba, vol. 1, p. 141.
[5] Barriga Villalba, vol. 3, p. 503.

During the 1627–33 period, all Colombian silver coins were restruck by order of Philip IV and more than half of the 4.6 million reales minted in these years consisted of recoinage. The 1653–55 years were affected by Philip IV's edict of December 22, 1650, which recalled the debased Bolivian silver of the late 1640s and mandated a new "Pillars and Waves" design for all Spanish colonial silver except Mexican cobs.

The historical, scientific, and stylistic evidence all indicate that two mints were in operation. The only unresolved question is "Were the first coins of Nuevo Reino minted in Santa Fe or Cartagena?" Coins recently salvaged from the wreck of the *Atocha* which sank southwest of the Florida Keys September 6, 1622 have provided critically important new data.

Among the *Atocha* pieces are some of the earliest coins of Nuevo Reino, those dated 1622 which carry two escutcheons (Plate 13, 1–2). One escutcheon is an abbreviated shield of Portugal which is superimposed on the emblems of Castile and Leon and Aragon in the upper section of the Hapsburg shield, while the other is that of Flanders and Tyrol in the lower section. These are the only coins of Spanish America to have two such imposed shields similar to those on Peninsular pieces.

The *Atocha* coins dated 1622 include several cobs of two reales and three of two escudos all struck from the same Hapsburg shield obverse die. Significantly, these coins carry the ordinal of Philip III (Plate 13, 3) despite his death in 1621 and have a mint and an assayer initial of S above what photographic study indicates to be a broken E assayer initial to the left of the shield (Plate 13, 4).[*] Because of the superior die work and the presence of Philip III's ordinal, it is logical to believe that the basic die for these pieces was designed and probably made in Seville rather than in the New World. Furthermore, it appears likely that not only were these the first coins of Colombia, but also that they were produced in Cartagena.

1) The E assayer on the two reales and the two escudos with the Philip III ordinal quite probably was the same E assayer who worked at the Cartagena mint during the latter half of the 1620s and the first half of the 1630s.

[*] As this broken E looks more like an F to the naked eye, the standard interpretation is that the letters SF indicate the mint of Santa Fe and no assayer is indicated.

2) Assayer **E** was followed by an unknown **A** assayer at Cartagena in 1622 who struck coins with both Philip III's and Philip IV's ordinals. These are more crudely made pieces with an **R** above **N** to the left of the shield and no niche on the shield for a pomegranate (Plate 13, 5), the emblem specific to the city of Santa Fe as set forth in a royal edict of April 1, 1620, which describes the authorized design for a billon coin, a cuartillo: "...the insignias that this money is to have for one part (side) is the Arms of Castile and Leon...and the other, two columns with a granada (pomegranate) in the center, *insignia of the city of Santa Fe proper...*" (italics mine).

3) This Santa Fe cuartillo, (Plate 13, 6), minted in 1622, has an 'S to the left of its shield and an **A** assayer's initial to the right. Most importantly, it carries the ordinal of Philip IV. It is likely that this **A** assayer was Iñigo de Alvis, one of Alonso Turrillo de Yebra's lieutenants who acted as treasurer at Santa Fe during Turrillo's absences. The cuartillo also has the unconventional characteristic of reversed castle and lion emblems of Castile and Leon, an error that persisted on Santa Fe coins until the mid 1640s and reappeared spasmodically thereafter.

4) There are several larger denomination coins from the *Atocha* dated 1622 which appear to be part of the same series as the cuartillo. All have the ordinal of Philip IV, an 'S to the left of the shield, an **A** to the right, *and a stylized pomegranate centered at the base of the Hapsburg shield* (Plate 13, 7).

5) To date, no Colombian coins have been discovered with 'S to the left of the shield and **A** to the right with Philip III's ordinal.

Based on the preceding sequence of observations, the logical conclusions are as follows: 1) The 1622 Philip III cobs with S above 'E to the left of the shield were Colombia's first coins—and they were minted in Cartagena. 2) The 1622 'R above **N** (apparently a backward NR) to the left of the shield with assayer **A** to the right of the shield, no space for a pomegranate and Philip III's ordinal, were the second group of coins from Cartagena. 3) The 1622 S to the left of the shield and **A** to the right with a pomegranate and the ordinal IIII of Philip were the first coins of Santa Fe and were minted at about the same time as Cartagena began to strike RN coins with the same ordinal.

During the later 1620s, Cartagena continued to produce silver coins primarily bearing the letters **RNE**, but also **NRE** and **NER**. These cobs

also have no niche on the Hapsburg shield for a pomegranate and their reverses show the castles and lions of Castile and Leon in their proper quartered positions (Plate 13, 8). During the early 1630s, the primary differences between Cartagena and Santa Fe silver pieces are that the Cartagena coins carry **CE** mint and assayer designation while the Santa Fe cobs have **NRP** and **NRA** to the left of the Hapsburg shield, and, of course, on Cartagena coins the castles and lions are in their prescribed positions, not reversed as they are on the Santa Fe coins (Plate 14, 9).

Differences between Cartagena and Santa Fe gold also are easily visible. Virtually all Cartagena gold cobs of the 1620s and 1630s have their denominations to the left of the Hapsburg shield and the mint and assayer initials to the right. On the reverse, stylized thin-leaved ornaments extend from the innermost points of the tressures surrounding the cross into the fields contained by the outer end-bars of the cross, and there are small dots or crosses in the field above the ends of the vertical and horizontal arms of the cross (Plate 14, 10–11). In contrast, during these years Santa Fe pieces carry the mint and assayer initials to the left of the shield and the denomination of the coin to the right. On the reverse are fuller, more fleur-de-lis or ribbon-like ornaments extending into the inner fields contained by the end-bars of the cross, but there are no ornaments in the fields at the ends of the arms of the cross and the annulets at the indentations of the tressures are larger and more important.

After the mid 1630s, the Cartagena mint appears to have halted its activities until the early 1650s, reactivating production subsequent to Philip IV's recall of all Bolivian silver in December 1650. Even though Barriga's records show unusually large Colombian silver-coin output in 1651, 1654, and 1655, the only known late Cartagena silver pieces are dated 1655. These coins are rare but readily identifiable. The Cartagena cobs carry a **C** and **S** mintmark and assayer on the shield side of the coins (Plate 14, 12–13) and are considerably more elaborate than Pedro Ramos's assayer mark **R** and mintmark **NR** on the simplified "Pillars and Waves" design of Santa Fe cobs of the same period (Plate 14, 14). To date, no Cartagena gold coins are known for the 1650s and, historically, there appears to be no reason for their production.

Because all Colombian gold, silver, and billon cobs are, in an absolute sense, quite rare, numismatic research relating to the series is still in its early phase. A number of major unanswered questions remain.

1) We know that the Spanish governmental authorities were very careful and systematic, but we have not found the records of Cartagena production in the Archives of the Indies or anywhere else. They should exist.

2) What has happened to the small silver and billon coins of Cartagena? We have not as yet identified any medios or cuartillos from Cartagena, but considerable official correspondence is devoted to such coins.

3) Who were the assayers at Cartagena? Their names should be listed somewhere in the Archives.

4) Did Turrillo use **RN** as a mintmark for the early coins of Cartagena and **NR** for those of Santa Fe because he wanted to distinguish between the output of the two facilities without acknowledging that he had overstepped his authority by producing eight reales, four reales, two reales, and gold at Cartagena?

5) Why have we not been able to identify pieces other than 1655 from the later Cartagena mint production?

KEY TO PLATES

 1. Cartagena 1622, 2 escudos
 2. Cartagena 1622, 2 reales
 3. Cartagena 1622, 2 reales, Philip III ordinal
 4. Cartagena 1622, 2 reales, S and E
 5. Cartagena 1622, 8 reales, Philip III, RN and A
 6. Santa Fe 1622, cuartillo, S and A
 7. Santa Fe 1622, 4 reales, S and A
 8. Cartagena 1620s, 1, 2, and 4 reales, RNE
 9. Cartagena 1630s, 1, 2, and 4 reales, C and E
10. Cartagena 1630s, 2 escudos, C and E
11. Santa Fe 1620s, 2 escudos
12. Cartagena 1655, 1 and 4 reales, C and S
13. Cartagena 1655, 8 reales, C and S
14. Santa Fe 1651, 8 reales, P^{O}RM and S

THE VIRGINIA HAPPY WHILE UNITED MEDAL

(PLATE 15)   JOHN W. ADAMS

On its face, Virginia's *Happy While United* is a simple medal. Its obverse is the state seal; its reverse depicts a white man and an Indian smoking the pipe of peace and the date 1780. Therefore, it must be an Indian peace medal issued by Virginia in the year indicated. However, given that there were no Indian treaties negotiated in the common-wealth in 1780 and given that no information on any substantive aspect of the medal has ever surfaced, the piece is not so simple as it first appears.

William Summer Appleton first called attention to the subject. Writing in the *American Journal of Numismatics* in 1868, he described his "curious copper medal."[1] Two years later, he wrote: "Nothing whatsoever is known about this strange piece nor another specimen. I consider it a great curiosity."[2] Appleton was not the last to profess his ignorance: in 1894, in his master work on historical medals, C. Wyllys Betts places "Indian Medal, Virginia" as number 570 on his list.[3] He notes a pewter specimen in the British Museum in addition to Appleton's piece but, otherwise, can shed no new light on the subject.

Charles A. Flagg, curator of the Bangor Public Library, was the next to broach the subject. Writing to the *Virginia Magazine of History* he

[1] William Summer Appleton, review of *Collection de monnaies d'Amérique du Nord de 1652 à 1858* by M. Alexandre Varremare, *AJN* OS 2 (April 1868), p. 110.

[2] *Massachusetts Historical Society Proceedings, 1869–1870* (Boston, 1871), p. 261.

[3] C. Wylly Betts, *American Colonial History Illustrated by Contemporary Medals* (Boston, 1984), p. 261.

described a new example of the medal in "copper or bronze" and noted "It would be a natural inference that we have here a piece struck in commemoration of some Indian Treaty concluded by the State in 1780, but no one seems to have heard of this particular medal. Information will be gratefully received...."[4] After no help was forthcoming, Flagg wrote again to the magazine: "It would seem that some peace or treaty by Virginia with the Indians was commemorated by it. Mr. Howland Wood of the American Numismatic Society of New York writes us that it is one of a number of medals given to Indians in colonial times, regarding which next to nothing is known."[5] Thus, historians and numismatists alike were stumped.

In 1988, George Fuld and Barry Tayman undertook a study of both the New York and the Virginia *Happy While United* medals.[6] Fuld and Tayman, both outstanding numismatists, did a thorough job of researching the New York pieces. However, on the Virginia medal, they ran into the same blank wall as their predecessors. The paucity of information unearthed on the subject, combined with the unfamiliar fabric of the medals caused them to conclude: "There is little doubt that these medals were not made in or around 1780.... Until further data on these Virginia medals are available, they must be relegated to an apochryphal [*sic*] position in the Indian Peace Medal Series."[7] Years of mystery had begat frustration, and frustration begat an erroneous conclusion.

THE TIMES

The year 1780 began poorly for the American cause. The British had transferred their focus to the south and, in the initial action of that campaign, General Clinton successfully laid siege to Charlestown, capturing General Lincoln's entire army in the process. Moving inland, Lord Cornwallis was opposed by a hastily formed Continental Army

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[4] "Notes and Queries," *Virginia Magazine of History* 23 (Richmond, 1915), p. 197.

[5] Letter from Charles A. Flagg, "Notes and Queries," *Virginia Magazine of History* 24 (Richmond, 1916), p. 198.

[6] George Fuld and Barry Tayman, "The Montreal and Happy While United Indian Peace Medals," *The Medal in America*, COAC 4 (New York, 1987), pp. 19–44.

[7] Fuld and Tayman (above, n. 6), p. 37.

under the hero of Saratoga, Horatio Gates. In August, Gates met the British at Camden and lost the battle in disastrous fashion. There was now no organized resistance between the victorious British and Virginia, which was their ultimate target. Almost miraculously, an American force sprung up comprised of various militia units from the western frontier. This volunteer army stalked, attacked and, on August 16, conquered a superior force of British regulars at Kings Mountain. This victory, little known but nonetheless a turning point in the affairs of this country, was followed three months later by Daniel Morgan's stirring triumph at the Cowpens which, in turn, led to the road to Yorktown.

Thus, Virginia in 1780 was the epicenter of the American Revolution. To the north lay Washington's main army. To the south lay the Second Continental Army, headed variously during the year by generals Lincoln, Gates, and Greene. To the east lay the Chesapeake Bay, a possible invasion route and one that was, in fact, used by Benedict Arnold with his Tory forces on New Year's Day of 1781. Virginia also possessed western borders that were of consequence to the war. Throughout the colonial period, the commonwealth had taken the lead in pushing its settlers and its land aspirations westward. During 1780, it built a fort on the Mississippi River at the mouth of the Ohio, some 600 miles from the capitol of Richmond. Active campaigns were conducted by the state militia as far to the northwest as Detroit and as far to the southwest as Natchez.

The cost of war on all fronts was formidable. Unable to get its tobacco to market, except by way of an arduous trip to New Orleans or via an uncertain voyage to France, Virginia fell behind in its obligations to the Continental Congress. Its paper money depreciated from 40 Virginia pounds to 1 English pound all the way to 150 to 1 in a 12 month period. There were shortages of almost every material and implement needed to maintain the armies. It is not clear why any person would seek public office under the circumstances. However, as 1780 began, Thomas Jefferson was governor of the commonwealth and, on June 4, he accepted a second one-year term. Most of his time was spent on logistics—finding manpower to fill the ranks, supplies to keep them going, and money to pay for the whole. There was little time for reflection amidst the daily struggle.

Despite the overwhelming demands of responding to crises, Jefferson did manage one political initiative. He sought to negotiate a formal peace agreement with the Cherokee, the dominant Indian tribe on Virginia's western and southwestern frontiers. The Cherokee, though strategically important to Jefferson, had already begun their decline as a nation. This decline was to culminate a half century later in the infamous March of Tears, ordered by Andrew Jackson as his final solution. Their sad fate notwithstanding, the Cherokee were an enlightened people. The essence of their remarkable culture is well captured in a speech made by Chief Onitossitah and included here as an Appendix. In writing about Virginia during this period, those history books that depict the white man as the civilizer and the Indians as the savages are utterly mistaken. The Cherokee were important allies to secure.

In summary, Virginia in the year 1780 was a scene of relentless activity. The Continentals fought the British; the Whigs struggled with the Tories; and the white man confronted the Indians. Clearly, a medal that purports to be of that time and from that place has a rich heritage in which to seek a home.

THE MEDAL

After publication of the Fuld-Tayman paper in 1988, Virginia's *Happy While United* remained a mystery, but it had now been branded a nineteenth century fabrication. There it might well have languished. The first evidence to the contrary came to our attention, in serendipitous fashion, in the notebook of Pierre Eugene Du Simitière. Born in Switzerland, Du Simitière emigrated to this country in 1764 or 1765 where he became a fierce patriot of his adopted land. As a talented artist by vocation, he sketched most of the prominent figures of revolutionary times before his death in 1784. On the numismatic front, he executed the first Seal of the United States and, less well known, he sketched a design for the *Washington before Boston* medal, for which he was paid 32 dollars but which was never struck.[8] Du Simitière was also

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[8] *Journals of the Continental Congress, 1774–1789*, ed. Worthington C. Ford et al. (Washington, 1904–37), p. 485, 29 Nov. 1776: "Paid P. E. DuSimitiere for designing,

an antiquarian, a naturalist, and an indefatigable collector. His accomplishments in this latter regard have been well chronicled by Joel J. Orosz.[9]

In his notebook under the date May 1781 is an entry that reads "A cast copy in copper of a Medal made in Virginia last year to be given to the Indians having on one side Liberty trampling down a Tyrant round it, 'Rebellion to Tyrants is Obedience to God.' On the top Virginia. On the reverse a white man and an Indian sitting on a bench, under a tree with a pipe in his hand, round 'Happy While United,' in the exergue 1780, a pipe, an eagle's wing on the top of the medal with an opening to suspend it by, the gift of Isaac Zane, Esq."[10] This entry demonstrates that the piece was indeed made in the year indicated, whatever the motive for its creation.

The design of Virginia's *Happy While United* seems simple enough. The reverse is very similar to that of the *Happy While United* medals issued by Sir William Johnson in 1764 and 1766, except the composition of the details is a mirror image, as if the design were taken from an impression. Elements common to both Johnson's and the Virginia pieces include the seated figures (an Indian and a white man), the tree under which they sit, the peace pipe being passed, and the ships on the water in the background.

Sir William Johnson headed His Majesty's Northern Department for Indian Affairs. The earlier *Happy While United* medals were originally commissioned by the commander-in-chief for America, General Thomas Gage, for distribution in the Southern Department.[11] Although numismatists have paid little attention to the southern branch, it conducted active relations with the Cherokee in particular. Thus, Indians in the Virginia area were familiar with the *Happy While United*

making and drawing a medal for General Washington, $32." See also William John Potts, "DuSimitiere, Artist, Antiquary and Naturalist," *Pennsylvania Magazine of History* 13 (Oct. 1889), p. 357.

[9] Joel Orosz, *The Eagle That Is Forgotten* (Wolfeboro, 1988).

[10] William John Potts, "Du Simitrere, Artist, Antiquary and Naturalist," *Pennsylvania Magazine of History* 9 (Oct. 1889), p. 375.

[11] *The Papers of Sir William Johnson*, ed. Alexander C. Flick (Albany, 1925), vol. 4, p. 447, a letter of June 10, 1764, from Gage to Johnson.

design and, going one step further, would have been inclined to accept it as official.

The obverse of the medal is the young state's first seal: a classic representation of Virtue, with a spear in her left hand and a sword in her right, stands proudly upright, her left foot resting on the prostrate figure of George III. About the periphery is the motto **REBELLION TO TYRANTS IS OBEDIENCE TO GOD**. The initial design, created by a committee of the Virginia legislature headed by the scholarly George Mason, was far more allegorical. Virtue's foot rested on a globe rather than a person and the motto was **SIC SEMPER TYRANNIS**.[12] The only local artisan capable of executing the seal—Robert Scot, the man who later created the molds for the medal—was occupied in making plates for a new issue of paper currency. Mason sent his plans to Philadelphia where a young delegate to the Continental Congress, Thomas Jefferson, sat on a committee of that body charged with designing a national seal. The chairman of the committee, Benjamin Franklin, proposed his favorite motto, **REBELLION TO TYRANTS IS OBEDIENCE TO GOD**. Jefferson was so struck by the relevance of this idea that he applied it to the Virginia seal as well. He further modified the Virginia committee's design by substituting King George for the globe under Virtue's foot. His reasons for so doing are a matter of conjecture. However, it may be more than coincidence that the substitution followed the deletion by Congress of an extensive section of charges against George III from Jefferson's first draft of the Constitution. Whatever, in his version of the state seal, Jefferson deliberately contravened the expressed intent of the Virginia legislature, a fact which underlines the importance he assigned to the project.

Perhaps the ultimate coincidence is that both the Virginia seal and the national seal were executed in the summer of 1776 by the very man whose diaries launched the present investigation, Pierre Eugène Du Simitière. Isaac Zane, who sent Du Simitière his medal, was a prominent Virginian of the time. A member both of the House of Burgesses under the crown and the General Assembly after Independence, he was also the proprietor of the thriving Marlboro Iron Works.

[12] Edward S. Evans, "The Seals of Virginia," *Report of the Virginia State Library, 1909–1910* (Richmond, 1911), p. 31.

His trade combined with his now-known linkage to the medal made him a logical source of the dies—but this proved to be a false trail.

The standard Virginia references, in and about the year 1780, are replete with references to Indian affairs. The most suggestive is a letter, dated December 13, 1780, from Indian Commissioner Joseph Martin to Governor Thomas Jefferson: "Sir—On my return to this place, I immediately transmitted your Excellencies' Dispatches to the Chiefs of the Cherokees, which I seconded with some letters of my own—and Divers private messages with meddles [sic] etc. but unfortunately all arrive too late—the British agents had succeeded in their negotiation and the most of the Chiefs and Warriors of the Old Towns had determined to take a decisive part against us."[13] Confirmation of the British success is to be had from both British and American sources. However, the key point is that the Americans both prepared "meddles" and intended to use them to conclude a treaty.

In *The Papers of Thomas Jefferson*, Julian Boyd publishes an invoice, buried among contingent fund vouchers in the Virginia archives, dated October 12, 1780, from Robert Scot, the artisan who later became the first engraver of the United States Mint.[14] Scot, then located in Richmond (he did not move to Philadelphia until 1782), submitted a bill for a medal for £4,760.14.0 in local money. By then the Virginia pound had depreciated to an exchange rate of 140 for 1, with the English pound in turn worth 3 Spanish dollars. Thomas Jefferson checked these calculations in his own hand on the back of the invoice, and approved it for payment on October 21, noting that the workmanship was "extraordinary good." Scot's charges included £3,150 for "Engraving and making a Medallion mould in brass and casting patterns," £15 for "pewter for Patterns" (note the plural) and £1,554 for 37 Spanish silver dollars. Working from the known weight of a copper medal and adjusting for silver's greater specific gravity, 37 Spanish dollars would have provided enough silver to cast an even dozen medals. Boyd goes on to opine that "There can be little doubt

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[13] *Calendar of Virginia State Papers*, ed. William P. Palmer (Richmond, 1875), vol. 1, p. 397.

[14] *The Papers of Thomas Jefferson*, ed. Julian P. Boyd (Princeton, 1951), vol. 4, p. 35.

that this [the medals] was done on the occasion of a visit to Richmond by Potclay and other Cherokee chiefs, whom TJ planned to have continue their travel northward to Congress and Washington's army."[15] There is some logic to this conclusion but there are also arguments against it. For example, to have sent Potclay to the nation's capital wearing a Virginia peace medal would have been a diplomatic faux pas. Further, the Cherokee were an honorable people, who would not have accepted Jefferson's medal in October only to exchange it for a British medal six weeks later. Finally, Colonel Martin and Potclay, better known as Oconastote, were close friends; this relationship makes it even less likely that any understanding concluded in Richmond was so soon betrayed. Thus, whereas Jefferson undoubtedly hoped to hand out medals during the visit of Oconastote, the exchange probably was delayed.

The Cherokee, it should be noted, were not a monolithic nation. Their lands spread across present day Kentucky, eastern Tennessee, western North Carolina and the mountainous corner of Georgia. The Upper Towns, of which Oconastote was a representative, were the moderates. Although they did join the British in 1780, they were quick to come to terms at Holston in July 1781. Previously, they had negotiated a treaty with the Virginians in 1777. It was this latter treaty that occasioned a sharp division within the Cherokee nation. At that time, the hawkish faction led by Dragging Canoe left to form the Lower Towns. These Indians, who became known (by their locale) as the Chicamauga, were at war with Virginia more or less continuously until signing a treaty in the fall of 1783.

Beyond the Cherokee, the Chickasaw to the west and the Creek to the south also played an active role in the events of the day. Typically, these tribes were used by the British or the Spanish to inflame the Cherokee and, in turn, to mount joint expeditions against the western settlers. All Indians, be they Cherokee, Chicamauga, Chickasaw, or Creek, had but a single grievance—land. There would have been peace on Virginia's distant borders if its citizens had not been moving relentlessly outward.

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[15] Boyd (above, n. 14), vol. 4, p. 36.

We do know that on May 30, 1781, Jefferson wrote Scot from Charlottesville requesting him to "make a medal of the kind formerly made"[16] and to send it at once so that it could be presented to an Indian chief from Kaskaskia (Illinois) then visiting. Thus, the Governor's supply was exhausted at that date. Martin, who possessed the original batch of medals, was on the frontier making preparations for peace talks at the time. Presumably, he distributed the medals at the treaty of Holston, negotiated with the Cherokee in July 1781. There was no earlier occasion in 1781 worthy of commemoration.

Between 1781 and 1789, when the federal government took over Indian affairs, the Commonwealth of Virginia executed numerous treaties with the Cherokee, the Chicamauga, the Chickasaw, and the Creek. Relations were also conducted with a number of the north-western tribes, including the Kaskaskia, the Shawnee, and the Delaware. It is clear that medals were handed out at some, if not most, such occasions.

Five silver medals were made for the Cherokee in June 1780[17]—before the Scot molds had been engraved. In June 1787, the durable Joseph Martin wrote to Governor Edmund Randolph thanking him for "the letter enclosing silver medals, which I shall deliver agreeable to your Excellencie's request."[18] All of which serves to create a new mystery: if so many silver medals were handed out, why have none survived?

Almost certainly, one or more silver medals have survived and will some day come to light. However, the reason that they are extremely scarce is straightforward: many if not most of the Virginia medals were exchanged for Federal replacements. In a talk given at the Cherokee village of Chota, Tuskegetchee (Long Fellow) gave his opinion of the prospect of such an exchange: "I have long taken the Virginians by the hand and have at this time one of their meddles around my neck. I would be sorry to throw that off and put on a strange one."[19] In like manner, in a conference with the Secretary of War Knox on January 5, 1792, Bloody Fellow returned two medals "that had been presented by

[16] Boyd (above, n. 14), vol. 4, p. 36.
[17] *Virginia Council Journal*, vol. 2, p. 258.
[18] *Calendar of Virginia State Papers* (above, n. 13), vol. 4, p. 302.
[19] *Calendar of Virginia State Papers* (above, n. 13), vol. 4, p. 307.

Colonel Martin about four or five years ago."[20] Perhaps somewhere in our musty national archives there exists a chest filled to overflowing with these magnificent signposts of the past.

Fortunately, there do survive a handful of Virginia's *Happy While United* medals that have been made in other metals. 1) The Du Simitière acquisition, bronze, probably identical to one of the pieces listed below; 2) W. S. Appleton/Massachusetts Historical Society, now missing, plated in volume 4 of *The Papers of Thomas Jefferson*, copper; 3) British Museum, pewter; 4) Bangor Public Library, copper or bronze, reportedly destroyed by fire; 5) American Art Association, Oct. 27, 1933 (Senter), 42, copper, sold for $22.50 to "GB" (the only piece bought by that bidder) and not since located; 6) Eastern Collection, from a bulk lot in a sale by Spink's in the 1970s and thence to an Ohio collector, copper; and 7) Connecticut Collection, bronze, provenance not reported but holed, without hanger. The diameters of five of these pieces (one from a photograph, three from recordings by others) range between 72.4 and 73.0 mm; the two medals available for physical inspection weighed 73.75 and 77.76 g.

Other than Scot's invoice for brass molds, there is no contemporary documentation as to the method of manufacture. However, surviving specimens tell the story with sufficient eloquence. The pewter example in the British Museum has smooth surfaces and its devices stand out in sharp relief. Circular lines used to position the motto are clear as is the preliminary outline of Virtue's sword. Though described as a cast by Fuld and Tayman, the piece is clearly struck. Scot probably used a screw press to apply his brass molds to a rolled sheet of the soft pewter.

The bronze specimens, all of which possess rough surfaces and rounded details, are obvious casts. Indeed, the one specimen available to the author for direct inspection, had a "blow hole" on its edge. Because bronze has a higher melting point than brass, the medals could not have been cast directly from the molds. The two processes available to an eighteenth century Virginia artisan would have been the lost wax method and sand casting. The latter process seems to have been used,

[20] *American State Papers—Indian Affairs*, ed. Walter Lowrie and Matthew St. Clair Clarke (Washington, 1832), vol. 1, p. 203, "Conference of the Chiefs of the Cherokee Nations, January 7, 1792," as submitted by Secretary of War Henry Knox.

given the roughness of the surface and the scattered sand particles in the medals. Sand casting involves impressing a matrix in a box of fine French sand. The reverse side is then impressed in a second box and the two boxes joined after making provision for a channel into which to introduce the molten metal and other smaller channels through which to exhaust gases emitted by the heated metal. It is unlikely that the British Museum pewter medal served as a matrix because its diameter is roughly the same as the diameters of the surviving bronze specimens. Normally, the cast metal would undergo some shrinkage while cooling, resulting in a diameter that was some two to five percent smaller than its source. It would seem that another piece existed and was the matrix used for the bronze medals.

The *Happy While United* medals issued by New York in 1764 and 1766 appear to have been cast by a different process. The artisan, Daniel Fueter, achieved higher relief and smoother surfaces. All available pieces of this design are in silver so that, lacking pewter and bronze examples, direct comparison is not possible. According to the Scot invoice, the pewter medal was struck as a pattern. As with the Du Simitière example, copper examples were probably made for collectors, dignitaries, and those who could not afford the high cost of silver. No doubt, some parallel exists with the Comitia Americana series although, with Virginia's *Happy While United*, it would seem that the original population of silver examples far exceeded the copper. Silver, pewter, or copper, the medal now emerges as one of the most important in the entire American series:

1) The piece was conceived, executed, and distributed in perhaps the most pivotal year of our nation's history in perhaps the most pivotal geographic region;
2) The medal is directly attributable to one of our Founding Fathers, Thomas Jefferson, as well as being an actual instrument of his political policies. "Rebellion to tyrants is obedience to God" was Franklin's favorite motto, thus adding his personal stamp to the medal as well;
3) Virginia's *Happy While United* has a numismatic history all its own; in the course of 125 years, it has gone from obscurity to mystery to rejection and now to prominence.

Here, indeed, is a story with a happy ending.

APPENDIX

In 1777, the former Colony of Virginia negotiated a peace treaty with the Cherokee. Representing the Indians, Chief Onitossitah (Corn Tassel) spoke as follows.

"It is a little surprising that when we enter into treaties with our brothers, the whites, their whole cry is 'more land.' Indeed, it seems to be a formality with them to demand what they know we dare not refuse.

"Again, were we to inquire by what law or by what authority you set up a claim, I answer 'none.' Your laws extend not into our country, nor ever did. You talk of the law of nature and the law of nations, and they are both against you....

"Indeed, much has been advanced on the wont of what you term civilization among the Indians; and many proposals have been made to us to adopt your laws, your religion, your manners and your customs. But, we confess that we do not yet see the propriety of such a reformation, and should be better pleased with beholding the good effect of these doctrines in your own practice than with hearing you talk about them....

"You say: Why do not the Indians till the ground and live as we do? May we not with equal propriety, ask, why the white people do not hunt and live as we do?

"The great God of Nature has placed us in different situations. It is true that he has endowed you with many superior advantages; but he has not created us to be your slaves. *We are a separate people!* He has stocked your land with cows and ours with buffalo; yours with hogs and ours with bear. He has, indeed given you the advantage in this, that your cattle are tame while ours are wild and demand not only a larger space for range, but art to hunt and kill them. They are, nevertheless, as much our property as other animals are yours, and ought not to be taken away without our consent."[21]

[21] Samuel Cole Williams, *Tennessee during the Revolutionary War* (Knoxville, 1944), pp. 266-68.

JUARISTAS, IMPERIALISTAS, AND CENTAVOS: DECIMALIZATION AND CIVIL WAR IN MEXICO, 1857–1870

(PLATE 16)   RICHARD G. DOTY

To a greater or lesser degree, the numismatic history of each country is a reflection of larger social, economic, and political events within and beyond that entity. These events may be slow-moving, evolutionary. They may also be rapid, revolutionary, representing seismic breaks with the past. Whatever their type, they will have an effect on the monetary patterns of the state within whose borders they operate. They may spur reforms, as was the case in revolutionary France, with assignats and francs. They may force the demise of one type of currency in favor of another, as was the case with private and public paper in the United States during the Civil War. And they may occasionally channel and limit a currency reform, bending its path into directions never foreseen by the original reformers. Such was the case in Mexico in the middle years of the past century.

In Mexico, the period between the late 1850s and the early 1870s should, in theory, have been one of a rapid and simple evolutionary reform of an outmoded currency system. But the force of larger events intervened: instead of a quick and peaceful abandonment of one monetary system for another, Mexico and her people were subjected to an almost unbelievably complex series of shifting currency arrangements, in which desired reforms took on attributes which no one could

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have foreseen, and which, far from being rapidly implemented, were still causing disputes and confusion in the closing years of the century.

Prior to the 1850s, Mexico's national currency system had essentially retained the attributes of its colonial predecessor. Then the monetary unit had been the silver real, an inheritance from medieval Castile. Eight reales equalled a silver peso, the Spanish milled dollar so popular in early American commerce. Related coins of four, two, and one-half real were also struck, their finenesses identical to that of the larger coin. Gold coins were also tied to a relationship based on eights, fours, and twos: two silver pesos equalled a gold escudo, while eight escudos made up the onza. Lower denomination gold coins mirrored those in silver: four, two, one, and one-half escudo pieces rounded out the Spanish and early Mexican precious metal coinage systems.

With the coming of independence in 1821, two additional complexities entered the monetary scene, each with its roots in the last decade of the colony. First, a number of subsidiary mints, primarily located in the north-central mining country, began striking silver and gold coins on the traditional reales/escudo standard. Their products resembled coins from the mother mint in all respects save mint marks and assayers' initials. Second, a base metal coinage, representing quarters, eighths, and, occasionally, sixteenths of the silver real, was introduced, struck by the national government, by the states, and, on occasion, by municipalities. This copper and brass coinage reflected the need for small change in a very poor country. It was also a product of isolation, at the same time serving as a vehicle for local sentiment.

This was the nation's coinage system down to the middle of the nineteenth century. A series of nonmonetary events would soon call the validity of the old arrangement into question and inspire an attempt to replace it with a new one.

The major propellant was a lost war with the United States. The conflict of 1846–1848 jolted national sensibility, which found it extremely difficult to comprehend how a people of undoubted moral superiority could have possibly lost half the national domain to a nation of money-grubbing farmers and shopkeepers. In their search for answers and scapegoats, Mexico's intelligentsia eventually settled upon a set of villains—the backward triumvirate of Church, army, and large landowners—and a set of solutions—reform and modernization in line

with western European and United States "liberal" ideas. The nineteenth century would be allowed into Mexico to work its magic, and a strong and vibrant nation must necessarily result.

The reformers delved into many aspects of Mexico's economic and cultural life, proposing ameliorations of many sorts. They founded schools. They began the quantification of the nation, discovering its weaknesses and strengths. They built roads. They wrote earnest books. They reformed weights and measures. They undertook to reform money. But by the time they attempted this last, they had also begun the reformation of the role and power of two of the three Mexican colossi, the Church and the army. In essence, the liberals were impatient people, and they tended to attack on too many fronts at once. Their efforts were thus dissipated, ensuring that no one of them would turn out precisely as hoped.

Nowhere was this truer than in the case of monetary reform. Here, the desired move was towards decimalization—the replacement of the cumbersome, eight-to-one ratio with a logical somehow "modern" relationship based on the number ten. This simple substitution was to prove extremely difficult to achieve: it was talked about in the early 1850s, made law in 1857, made law again in 1861, reiterated in 1864, 1865, and 1867. But it never completely triumphed, and one suspects that the only reason it achieved any measure of success in the 1850s and 1860s was because it retained several of the pillars of the former monetary system, those coins which could be reckoned by both eights and tens.

The first serious discussion of decimalization seems to have taken place in 1853, during the less-than-liberal administration of Antonio López de Santa Anna. Apparently having nothing against a modern idea, so long as it posed no threat to himself, the dictator launched a decree on 13 December 1853, stating that, as of the first day of the following year, the peso would be composed of one hundred centavos rather than eight reales. This reform received scant attention at the time, and in any case its author soon had more important concerns, including fleeing the country ahead of a pack of enraged liberals.

The next attempt at a decimal monetary reform took place three years later. The product of another decree, by another president, the new law of 15 March 1857 created a new silver monetary unit, the

Mexican peseta, which was to weigh ten grams and contain ninety percent silver.

Let us briefly examine the political and social climate of opinion, the world into which this reform was launched. Santa Anna had been driven from office two years previously. The liberals had taken command of the national government. They had just finished writing the Constitution of 1857, a magnificent litany of liberal aspirations, which was to remain Mexico's fundamental law for the next six decades. They had also alienated conservative opinion within Mexico: their attempts to curb the wealth of the Catholic Church met with particular disfavor, and the bishops and other members of the old establishment were anxiously soliciting champions who would turn the godless reformers out of office, who would turn back the clock on progress. They never found a single champion strong enough to defeat the liberals, but they did find a sufficient number of medium-strength military *caciques* to throw the nation into prolonged civic chaos, the *Guerra de Tres Años*, or Three Years' War. This conflict disfigured the nation long after its formal conclusion late in 1860. At its end, Mexico was so weakened that it almost immediately fell prey to attack from abroad.

The liberal side in the civil war had more important matters on its mind than a coinage reform. The increasing unrest over the new constitution and the earlier anticlerical and antimilitary tenets of the *Ley Juárez* and *Ley Lerdo* of 1855–56 convinced President Ignacio Comonfort (who soon resigned and eventually came over to the other side) that monetary reform might best be postponed. His administration accordingly annulled its original decree of 15 March 1857 with a second decree of 8 July 1857. Larger realities had shaped decimal monetary reform in Mexico for the first time, but scarcely for the last.

By the end of 1860, Mexico again had a single president, the Zapotec lawyer Benito Juárez. A rock-solid, absolutely immovable man of liberal ideas, Juárez dominated national politics for the next fifteen years and Mexican national ideals up to the present. He decided to take up monetary reform precisely where the liberals had left off some four years previously (Juárez was that kind of leader—humorless, absolutely consistent, logical, and steadfast, qualities which, in the long run, made him impossible to defeat). Accordingly, four years to the day after the

first major attempt at a monetary improvement, Mexico was treated to a second.

This reform was not a complete leap into the dark, based upon an unfamiliar coin. Instead, Juárez took that most typical of traditional coins, the peso or piece of eight, and simply divided it in a new way. The four real piece was kept, as was the two. The change came with the lower denominations. Instead of reales and their halves and quarters, this reformed peso was to be divided into tenths and twentieths on the lower level. This was an innovation, but the wary were reassured by the fact that the actual silver fineness of the new coins would be identical with that of the old.

With gold, somewhat greater liberties were taken, but again, this was a compromise sort of reform, a reform with old and new aspects. The escudo and its multiples did not fit into a decimal system, and so they were abandoned in favor of a new, ten peso coin to be called an Hidalgo (after Miguel Hidalgo, who launched Mexico's war for independence against Spain in 1810; this name was subsequently dropped). A double Hidalgo of twenty pesos was envisaged, as were coins worth a half, quarter, and tenth of an Hidalgo (or five, two and one-half, and one peso—the latter the equivalent of the old half-escudo). The evolutionary nature of this part of the reform is suggested by the fact that, while most of the gold coins were new, their actual gold fineness remained exactly what it had been from the days of the colony—seven-eighths, or twenty-one carats pure gold.

The lower linchpin of the 1861 reform was to be a hundredth part of the peso, to be called a centavo. The coin would weigh about a third of an ounce and was to be struck from copper. This was a new departure: there had never before been an actual coin called a centavo in Mexican numismatic history. But there had been a goodly number of state and federal copper and brass coins of the same general size as the proposed new subdivision, so that this part of the reform also had a reassuring familiarity about it.

Such was the Juárez reform—an intelligent mixture of necessary change and comforting familiarity. In normal times, it would doubtless have been speedily accepted. But these were not normal times, and the new law soon encountered opposition on two fronts.

The foreign opposition took the form of a tripartite punitive expedition against the country and its liberal government, which soon devolved into the French Intervention and the empire of Maximilian, events well known even to the casual student of Mexican history. But there was domestic opposition as well, and, while not generally known even by Mexican numismatists, it nevertheless played a major role in the difficulties encountered by the decimal reform.

Writing thirty-five years ago, Alberto Francisco Pradeau noted that more than two years elapsed between the time of the 1861 reform and the capture of Mexico City and other mints towns by the French. Yet during those two years, only a trickle of new, decimal coins came forth, and only from two mints, Mexico City and San Luis Potosí. In fact, no more than three denominations were introduced, all of them apparently within the last few months of Republican control.

What had happened? Pradeau attributed this lack of enthusiasm for the new coinage not to the Juárez government, and not, solely, to the Intervention, but rather to foot-dragging on the part of the *arrendatario*, or foreign lessee of the Mexico City mint, which was also responsible for the preparation of dies for the other national coining facilities. The elaboration of new matrices involved more labor than the American tenant, John Temple, was prepared to undertake, especially as his relationship with the central government had long since soured. While Pradeau perhaps makes more of the mismanagement of Mexico's British, American, and French *arrendatarios* than is necessary, I think he does have a point here: the parent mint *could* have done more to implement the decimal reform. But it was not so inclined, and the Juárez government was not in a position to force it to do so.

That government would shortly be fleeing for its life, one step ahead of the French, coming to rest at last on the nation's northern border, at a town which came to be named for the refugee president. The armies of Napoleon III took Mexico City and most other important towns by the middle of 1863; within a year, they had established the well-meaning but witless Austrian Archduke Maximilian upon a short-lived imperial throne.

All of this had a direct effect on Mexico's money and on the attempt to make it decimalized. The Juaristas tacitly abandoned any idea of broadening the application of the law of 1861: to implement a coinage

reform, the government needed to designate *mints*, which were in rather short supply. Ironically, it was the French and Maximilian who drove decimalization forward. On 8 April 1864, the coinage of reales and their halves and quarters was suspended: pieces worth five and ten centavos were to be substituted for them. Almost precisely a year later, on 10 April 1865, this regal decimal coinage was expanded, a full range of coinage from half centavos in copper through twenty pesos in gold being planned. Detailed instructions were laid down as to fineness and design. Many of the coins were never struck, but six denominations did appear (one, five, ten, and fifty centavos, one and twenty pesos), struck at mints taken over from the republicans in Guanajuato, San Luis Potosí, Zacatecas, and, of course, Mexico City. Maximilian also attempted to reform the quality of Mexican coinage and, rather surprisingly, he managed to acquire a steam-powered coining press from Morgan & Orr of Philadelphia in the summer of 1865. The new machine struck beautiful, modern money in Mexico City; coinage from the other mints was a good deal more primitive, aptly symbolizing the precarious and anomalous position of a liberal prince in a conservative country with strong republican traditions. Maximilian's support evaporated with the departure of the last French bayonet.

The three years of his empire represent one of the most confused periods in Mexico's monetary history. The empire emitted decimal coinage from four erstwhile republican mints. It allowed the manufacture of predecimal coinage with the old national designs at several other mints. Almost all of these coins were pesos and onzas, representing the largest denominations in silver and gold: taking advantage of the confused situation, the lessees of these mints shirked their responsibility to provide the citizenry with lower denomination silver coinage. A good many of these imperialist coins with republican faces may have been struck from back-dated dies: it has occurred to me that there are a good many more pesos dated 1863 from Mexico City and Zacatecas than would have been necessary, or even plausible, given the disturbed nature of the country and its economy during that year.

Added to this predecimal coinage in precious metal was a fairly extensive emission of copper on the part of several states. Sinaloa struck cuartillas each year of the intervention through 1866, Durango provided two types of quarter reales in the same year (one pro-

Maximilian, the other pro-Juárez), while Chihuahua, which had become the center of republican resistance, produced heavy coinage of cuartillas in 1865 and 1866. They remain among the most common of Mexican nineteenth-century coins, and they are virtually the *only* readily obtainable issues of the nationalist side during the Intervention.

Added to all this were a few municipal issues, based on the old, predecimal standard. Copper cuartillas from San José de Avino, a mining town in the state of Durango, appeared in 1864. Other local issues may await discovery.

The entire imperial enterprise had been predicated upon continuing weakness and disunion within the United States: only in such circumstances could a European reoccupation of a sovereign western hemispheric state aspire to any degree of success. These hopes were dashed with the fall of the Southern Confederacy in the spring of 1865: continued French occupation of Mexico was no longer feasible. With the disappearance of its sponsors, the days of Maximilian's government were clearly numbered. Never one for a realistic assessment of the situation, the Hapsburg princeling saw support within Mexico where there was none. He paid for his poor judgment in June 1867, on the Hill of the Bells in Querétaro.

Maximilian's empire had in fact died several months previously, with the departure of the last French soldier. A triumphant Juárez re-entered Mexico City in July 1867, determined to take up affairs precisely where he had left them back in 1863. This included the matter of a decimalized coinage: on 27 November 1867, Juárez cast the nation's monetary system into the form it would hold for the next forty years.

The new law was largely a reiteration of the 1861 ordinance, with additional teeth. The peso remained at the center of the monetary system, to be struck at the traditional weight and fineness. Decimal coins in silver, gold, and copper were arranged on either side of this unit. A convocation of national and foreign artists would be held in Mexico City to select designs for the new money. And the old money, both of the predecimal type and of the empire, would all be abolished, called in, demonetized on 15 September 1868. From now on, Mexico would have a single type of coinage. It would be decimal. And it would be republican.

It would also be postponed. In their way, Juárez and his circle were no more attuned to Mexican realities than were Maximilian and his advisors. It was perfectly feasible to proclaim the rapid substitution of new money for old. But securing it, especially in a country prostrated by a dozen years of civil war and foreign invasion, was something else again.

In reality, during the next few years there was a groping after the reform rather than the reform itself. A number of odd occurrences took place, explainable only in an emergency situation. State coinage, calibrated to the old arrangement, continued in at least one place, San Luis Potosí. For silver and gold, unused, partially dated republican dies from the earlier 1860s and even later 1850s were resurrected, cleaned, repunched, and pressed into service. The mint at Guanajuato was especially enterprising in this regard, and such reworked dies are known for at least four denominations (three in silver and one in gold) for 1867 and 1868. Of course, it is possible to redate a die for any number of reasons: when Boulton, Watt & Company were supplying dies to the Guanajuato mint at the end of the 1830s, the Birmingham firm was asked to take back a series of 183– dated dies, to redate them 184–, making them usable for the new decade. But the concentration of redated dies at Guanajuato in the late 1860s may have something to do with the fact that this mint did not strike republican coinage with dates later than 1863, but did strike several decimal denominations for Maximilian. I suspect that the Guanajuato coiners had simply run out of republican dies dated 186– and were forced to delve deeper into their inventory, this odd run of redated coinage being the result. Hermosillo and Chihuahua also produced redated coinage about this time, though perhaps for different reasons.

The persistence of this older, predecimal coinage represented, in part, a belated recognition on the part of the Juárez government that coinage reform could not be accomplished overnight. So did a softening of the language concerning the demonetization of the earlier coinage, both predecimal and imperialist. In the case of earlier issues which did not fit into the new monetary scheme, a plan was eventually worked out whereby the Banco de México undertook to redeem old money for new, receiving three percent of the nominal value of the coins presented to it for its pains. But this was in 1888, not 1868: by that time, natural

attrition would have done part of the Bank's work for it. Natural attrition would also be resorted to in the case of Maximilian's decimal issues: here, the Juárez government appears to have realized that, until it could produce an abundant decimal coinage of its own, it would be wisest to leave alone what decimal issues were circulating, regardless of their origins. By 1870, this coinage was disappearing from commerce, at least in the larger business centers. But by that time, new, republican decimal issues were finally taking their places.

The Juárez government in fact issued two very dissimilar types of decimal coinage. The first was a purely emergency response, and it represented a continuation of those denominations struck on the eve of the Intervention. Coins in this first series largely retained traditional designs for silver coinage, and they consisted of five and ten centavo pieces, dated 1867 through 1870.

By the latter year, the second series was under way. It would eventually be produced by all mints with the full spectrum of coinage denominations foreseen in the 1867 decree. The reverse design employed for most of the gold and silver was new to the country's coinage, and it suggests that Juárez's artistic competition may have actually taken place.

Newly designed, definitively reformed, Mexico's coinage confidently faced the future. But the past had not, entirely, been escaped. The flagship of the newly designed silver coinage, the peso, had to be abandoned in favor of the predecimal piece of eight, due to fears on the part of Far Eastern businessmen that the new coins contained less silver than the old. This was nonsense, but in recognition of the importance of the Mexican silver trade with the Orient, Juárez's successor, Sebastián Lerdo de Tejada, decreed that, from 29 May 1873 onward, the Mexican peso would revert back to its old designs, module, and legends. For the next 30 years, Mexicans therefore had an odd monetary arrangement, wherein the centerpiece of a decimal system was not, technically, a decimal coin at all. This is unlikely to have confused or annoyed anybody at the time: to all intents and purposes, Mexico was now in firm possession of a decimalized, "modern" coinage system. This portion of the liberal dream had been successfully implanted in the national consciousness, and, if it took many years to achieve, and was

long held back by the force of other events, it eventually proved to be among the longest lasting legacies of *La Reforma*.

A NOTE ON SOURCES

The foundation of any discussion of nineteenth-century Mexican coinage must still be Alberto Francisco Pradeau's *Historia Numismática de México de 1823 a 1950*, 3 vols. (Mexico City: Sociedad Numismática de México, 1957–61). Pradeau is particularly useful for his lengthy citations of the laws respecting Mexican coinage; the legal provisions respecting Mexico's halting move to decimalization will be found in vol. 1 of the series.

Those interested in early coinage of the Mexican Republic may also wish to consult my 1986 article in the *British Numismatic Journal*, " 'A Mint for Mexico': Boulton, Watt and the Guanajuato Mint"; my upcoming book on that Birmingham, England firm will include information on all of the Mexican mints served by its technocrats (Mexico City, Chihuahua, Culiacán, Guanajuato, and Zacatecas).

The municipal coinage of nineteenth-century Mexico has been overlooked by all but a few specialists; indeed, most numismatists are unaware that such a coinage even existed. The difficulties in dealing with this branch of the discipline were perpetuated and increased by a lack of reference materials on the subject. *Las Monedas Municipales Mexicanas*, by Ing. Mauricio Fernández Garza (Mexico City: author, 1979), goes far towards filling this gap. His bibliography lists virtually every previous source on the subject, and, while his illustrations are essentially line drawings, they will give many numismatists their first look at a subject as fascinating as it is obscure. But much remains to be done on this aspect of early Mexican coinage and on Mexican numismatics in general.

The coins cited and illustrated in the course of this article come from the American Numismatic Society, New York, and the National Numismatic Collection, Smithsonian Institution, Washington. It has been my good fortune to work with both cabinets, whose splendid collections complement each other to a very great degree.

Richard G. Doty

KEY TO PLATE

1. 8 reales, 1827
2. 2 reales, 1863
3. 1 centavo, 1864
4. 1 centavo, 1869
5. 10 centavos, 1870
6. 5 centavos, 1870
7. 1 peso, 1873

CALCULATION OF THE AVERAGE DIE LIFETIMES AND THE NUMBER OF ANVILS FOR COINAGE IN ANTIQUITY

GILES F. CARTER AND ROSS S. NORD

Of the many issues of Roman Republican denarii, the large issue of P. Crepusius in 82 B.C. is one of the most important. Control marks appear on both obverse and reverse dies, and all dies are uniquely identified.[1] Reverse dies are numbered from 1 to 519, and obverse dies contain a combination of a group symbol and a letter of the Roman alphabet. In a photographic study of 1,865 Crepusius denarii, Carter has found a few instances when two reverse dies had the same number, and apparently some reverse die numbers were skipped. Considering all the data, we estimate the number of reverse dies to have been 515; the margin of error should be no greater than 10 dies, i.e., 515 ± 10 reverse dies were used to produce the Crepusius denarii. There are 25 obverse groups with various symbols, but the last group has only a single die. There are at least two other groups that do not have a full range of the 21 letters in the Roman alphabet.[2] We estimate the number of obverse dies of Crepusius denarii to be 470 ± 10 dies.

[1] C. A. Hersh, "Sequence Marks on the Denarii of Publius Crepusius," *NC* 1952, pp. 52–66.

[2] T. V. Buttrey, "The Denarii of P. Crepusius and Roman Republican Mint Organization," *ANSMN* 21 (1976), pp. 67–108.

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The large number of statistical data available from the Crepusius series has enabled the development of new methodologies, such as the calculation of the original number of dies based upon the number of coins and the number of different dies in a given study.[3] Much of the methodology being developed from the Crepusius issue is applicable to other Roman Republican issues, and, indeed, probably to most issues of ancient coins.

We define the terms die link and die combination by the following examples. There are ten known coins of Crepusius having the same obverse die feather-N (feather is the group symbol and N is the letter identification) and the same reverse die with the number 25. In addition there are three known coins with the identical feather-N obverse die and a second reverse die numbered 44. All 13 coins were struck from the same feather-N obverse die so all are **die linked** through the obverse die. The ten coins having the reverse die 25 are all die linked through the reverse die: all ten of these coins are said to be **double die linked** because they are die linked through the obverse die and also die linked through the reverse die. A **die combination** is a sharing of either the same obverse die with different reverse dies or the same reverse die with different obverse dies so that there are two die combinations above. This constitutes the beginning of a die chain in which many obverse dies and reverse dies are interconnected because the same dies, either obverse or reverse, are combined with each other.

The following are conventions that we shall follow.

n = the number of coins.

d_o = the number of known, different obverse dies in a given study (also d_r and d_{dc} for reverse dies and die combinations).

D_o = the original number of different obverse dies (also D_r and D_{dc}).

A = the number of anvils or "work stations" used in striking an issue.

t_o = the average obverse die lifetime in hours (also t_r and t_{dc}).

T = the total time in hours during which an issue was struck.

[3] G. F. Carter, "A Simplified Method for Calculating the Original Number of Dies from Die Link Statistics," *ANSMN* 28 (1983), pp. 195–206.

Using the data obtained from the study of 1865 Crepusius denarii, our objectives are 1) to develop a general method for calculating the approximate die lifetimes for ancient coinages, 2) to calculate the approximate number of anvils used for the Crepusius issue and to extend this method to other issues, and 3) to calculate the approximate number of Crepusius dies in the reverse die box.

CALCULATION OF THE NUMBER OF CREPUSIUS DIES IN THE REVERSE DIE BOX

The operation of ancient mints must largely be deduced from the coins themselves. The following is a summary of the probable operation of ancient mints such as the ones in which Roman Republican denarii were made. Each obverse die was probably surrounded by an iron band and held in place by being wedged in a wooden anvil. A coin flan was placed on the obverse die, and the reverse die was struck once (or sometimes twice); the coin flans were probably hot-struck. Efficiency probably required two or three men to carry out the coining process: one to strike the coins, one to place hot flans on the anvil die and to remove the struck coins, and possibly a third man to make hot flans readily available to the second worker. At night, the reverse dies were either returned to a die box or they were kept at a given anvil. It is unlikely (though possible) that the obverse dies were removed from the anvils for storage over night in a die box. Laboratory experimentation, however, is needed to confirm or modify the above concepts of mint operation.

The sequence in which the reverse dies of Crepusius denarii were engraved almost certainly started with die number one and continued in order of increasing numerals. The sequence of obverse dies is not as simple, but it was deduced by Hersh[4] by arranging the reverse dies in order and then observing the corresponding obverse groups. Hersh observed that usually two obverse groups of dies were being used at the same time. He arranged the 24 known groups of obverse Crepusius dies into a highly probable sequence.

[4] Hersh, "Sequence," pp. 55–58.

Our method for estimating the number of dies in the reverse die box involves the study of each obverse die of Crepusius linked with two or more reverse dies. When the lowest reverse die number is subtracted from the highest reverse die number for a group of coins having the same obverse, a number is obtained which we define as "**delta**." For example, the lowest and highest numbers on reverses paired with the obverse die feather-N are 25 and 44. The delta for this group of die linked coins is 19: delta = 44 − 25 = 19.

For Crepusius denarii, the overall average or mean delta is 19.1. If there were only one or two anvils and two or three reverse dies in the die box, the mean delta would necessarily be low, about 2 to 4. The rather large number for mean delta, namely 19.1, means there was one of the following: 1) more than ten anvils and only a few reverse dies in the die box, or 2) one or two anvils and more than ten dies in the reverse die box, or 3) a combination of several anvils and probably more than ten dies in the reverse die box.

In order to calculate the number of dies in the reverse die box, it is necessary to use a computer simulation of the operation of a Roman mint. B. G. Carter has written a powerful computer program simulating the operation of a Roman mint.[5] This program has been modified by Nord to enable calculation of the mean delta for reverse die links. The program enables one to choose values for each of the following parameters: 1) the number of 12-hour days that the mint operated for a given issue, 2) the average lifetime of obverse dies, 3) the average lifetime of reverse dies, 4) the number of dies in the obverse die box, 5) the number of dies in the reverse die box, and 6) whether all dies were returned to die boxes at night, or none were returned, or whether only the reverse dies were returned at night.

The computer assumes a variation of die lifetimes having a gamma distribution,[6] which was found by Carter for Crepusius denarii.[7] The

[5] G. F. Carter and B. G. Carter, "Simulation of a Roman Mint by Computer," *Proceedings of the 22nd Symposium on Archaeometry,* eds. A. Aspinall and S. Warren (Bradford, 1983), pp. 38–46.

[6] The gamma distribution found for the lifetimes of Crepusius dies is a distorted bell-shaped curve: there are relatively many dies that failed after short periods of usage, many that failed after moderate periods of time, and some that failed after

computer assigns a die lifetime to each obverse and each reverse die that is needed. When a die is placed into production, the computer subtracts one hour from its assigned lifetime after each hour of operation until the die uses up its lifetime, at which time it fails. Another die is chosen at random from the appropriate die box to replace the failed die.

Output from the computer includes: 1) the die combinations at each anvil for each day of mint operation, 2) the number of obverse dies, 3) the number of reverse dies, 4) the total number of die combinations, 5) the average lifetime of the die combinations, and 6) a listing of all reverse dies along with the obverse dies linked to them.

Finally, the program enables one to choose a sample of coins to be found at random from the dies that were used. Usually a very large number of coins is chosen for this, such as 1,000 to 5,000 coins. The computer then lists the complete die link statistics for the sample of coins and calculates the mean delta value. If a different sample is desired, the computer will repeat the task of finding a new batch of coins, and then it will print out the new die link statistics and mean delta.

Many simulations of a Roman mint using B. G. Carter and Nord's program have been run. Most trials assumed 127 days of operation[8] with reverse dies returned to the die box at night. Occasionally the number of days of operation was varied so that the number of dies used was held approximately constant. The number of anvils, number of dies in the die boxes, and average lifetime of the dies were systematically varied. For each variation 100 runs were made. After each run a random sample of 1,865 coins was selected and analyzed.

relatively very long lifetimes. The curve is skewed such that there were some very long-lived dies; i.e., the curve is not symmetrical, but is lopsided towards very long-lived dies.

[7] Carter, "A Simplified Method," p. 198.

[8] Buttrey, "The Denarii," p. 101, calculated approximately 125 to 130 working days based on the estimated fraction of Crepusius dies to the total number of dies used in 82 B.C. If the Crepusius coins were struck during the entire working year, ca. 320 working days, then some of our calculated results would need modification. Buttrey, however, argues persuasively that Crepusius struck coins alone during most of the 125 to 130 days.

Mean Delta vs. Number of Anvils
(Average Die Lifetime of 12 Hours)

◆— 8 Dies/Box   ◆— 18 Dies/Box
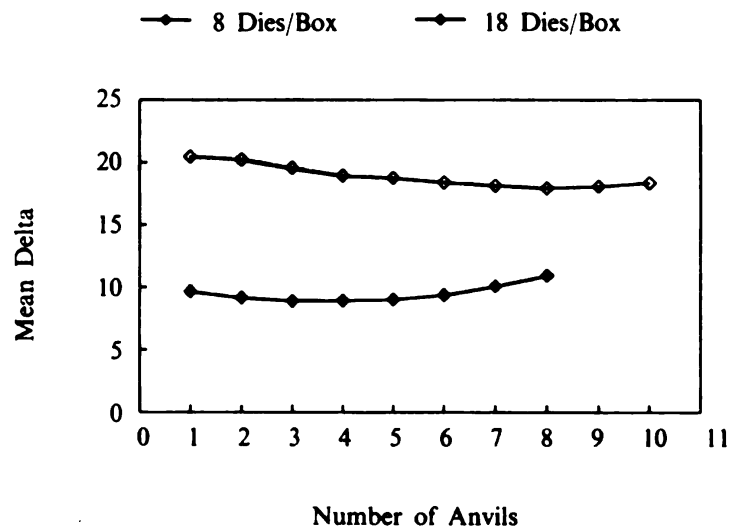
Number of Anvils

Mean Delta vs. Average Die Lifetime
(4 Anvils)

◆— 8 Dies/Box   ◆— 18 Dies/Box

Average Die Lifetime (Hours)

Mean Delta vs. Number of Dies in Box
(Average Die Lifetime of 12 Hours)

—•— 2 Anvils   —•— 8 Anvils
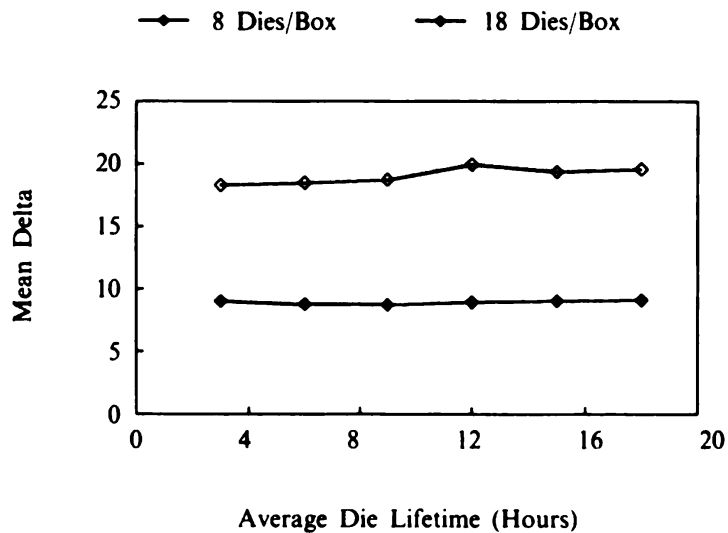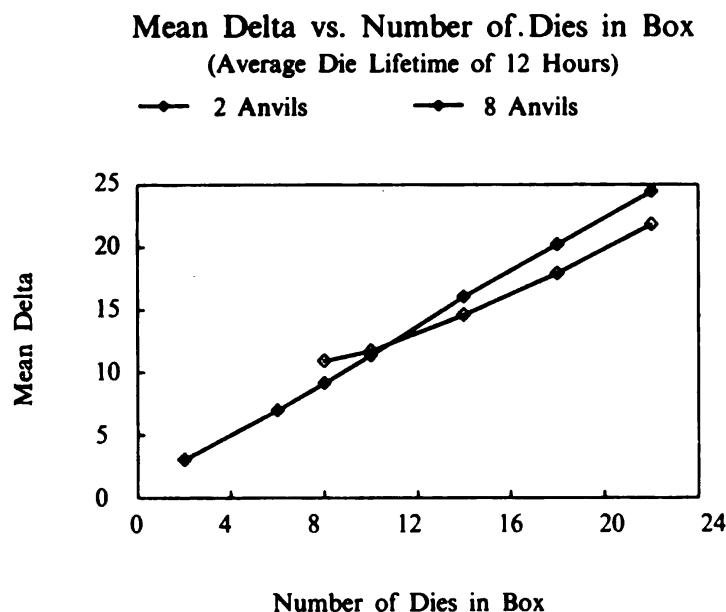
FIG. 1. Mean delta as a function of the number of anvils, the average die lifetime, and the number of dies in a box.

Results for mean delta were obtained from the computer program for simulating an ancient mint; mean delta is plotted as a function of several parameters in Fig. 1 (the reverse dies were returned to the die box each night). The value of mean delta is insensitive to the number of anvils and to the average die lifetime. However, there is a very strong correlation with the number of dies in the reverse die box. Additional results demonstrate that mean delta depends primarily upon the number of dies in the reverse box and is relatively independent of the number of dies in the obverse box (assuming reverse dies only are returned to the die box at night). From Fig. 1 it is apparent that mean delta is slightly greater than, but roughly equal to, the number of dies in the reverse box (with some deviation when the number of dies per box is small). Since the mean delta for Crepusius denarii is 19.1, we conclude that there must have been an average of about 18 dies in the reverse die box.

The method of "mean delta" to calculate the approximate number of dies per box has limitations: 1) it is limited to the Crepusius series (or

perhaps to a very few other series in which the reverse dies can be numbered sequentially); 2) it only gives the average number of dies in the reverse die box and is independent of the number of dies in the obverse box.

In many series of Republican denarii the number of reverse dies used was only slightly greater than the number of obverse dies (i.e., within 10 or 20 percent). It is reasonable to believe that the average number of obverse dies in the die box was the same or slightly less than the number of reverse dies in the reverse die box (we assumed that the number of dies per box was equal in all subsequent simulations).

CALCULATION OF AVERAGE DIE LIFETIMES

Using the computer program to simulate an ancient mint, Carter and Carter[9] derived the equation: $A \cdot T = D \cdot t$ or $t = A \cdot T / D$, where t is the average die lifetime, A is the number of anvils, T is the total number of hours during which the issue was produced and D is the original number of obverse (or reverse) dies in an issue. The original number of dies in the issue, D, may be calculated from die link statistics by several methods, preferably as given by Carter.[10] Sometimes T may be estimated: for instance, if the issue lasted for one year, one may estimate that T is approximately 300 work days times 12 hours per day, or 3,600 hours. Unless the issue was rather small and only one anvil was in use, the number of anvils used in almost always unknown. To date, there is no method for estimating the number of anvils used for producing large series of ancient coins.

The average lifetime of a die, t, is very important. If t were a relatively short time, such as less than 10 hours, then the number of coins struck by a die, on the average, would have been limited to about 10,000-20,000 coins at most. This assumes that it takes at least two to four seconds on the average to strike a coin; if t were 50 hours, however,

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[9] Carter and Carter, "Simulation."

[10] Carter, "A Simplified Method," pp. 201-2. This method requires only the number of coins in the study, n, and the number of different obverse dies, d_o (and d_r and d_{oe}).

then the average number of coins per die could have been five times the above range.

The average lifetime of a die, t, is related to two parameters of great importance: the *average number of coins struck by an obverse die* and the production rate of coins in *number of coins struck per hour* at each anvil. For instance, if the average number of coins produced by an obverse die were 15,000 and if the average coin production rate were 1,250 coins per hour (including non-productive periods such as time off for meals), then the average lifetime, t = 15,000 coins per die ÷ 1,250 coins per hour = 12 hours per die. Note that 3600 seconds per hour divided by 1250 coins per hour equals a little less than 3 seconds on the average to strike one coin. In order to produce coins at that rate, probably three men would have been employed at each anvil.

Undoubtedly many factors affected the average lifetime of dies, for example, the chemical composition and size of the coin being produced, the chemical composition of the die, the degree of relief on the die, the quality control exercised in making dies, and the technology available at the given time.

A very useful parameter is the **die combination ratio**, which we define as $D_{dc} ÷ (D_o + D_r)$, where D_{dc} is the original number of die combinations, D_o is the original number of obverse dies, and D_r is the original number of reverse dies. When dies are kept at a given anvil until they fail, it is reasonable that for each die failure there is a new die combination, and hence $D_o + D_r$ should equal D_{dc}. The die combination ratio should actually be slightly less than one because occasionally both dies may have been replaced simultaneously.

When dies are returned to the die boxes (or die box, if only the reverse dies are returned) at night, then the number of die combinations should be greater than $D_o + D_r$. The die combination ratio is greater than one since new die combinations can be achieved without the failure of a die. This has been clearly shown by the mint simulation program: in simulations of the Crepusius issue, the die combination ratio was equal to about 1 (i.e., the number of die combinations equals the number of obverse and reverse dies) when the dies were **not** returned at night.[11] When the dies were returned to the die boxes at night, the die

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[11] Carter and Carter, "Simulation."

combination ratio varied from just greater than one to about three. Therefore, the die combination ratio can often be used to determine whether the dies were returned to the boxes at night.

Results for the die combination ratio as a function of the various parameters are presented in Fig. 2. The results show that the die combination ratio has a very weak dependence upon the number of dies per box and the number of anvils and a relatively strong dependence upon the average die lifetime. Based upon the data in Fig. 2 and other results for longer lifetimes, the following empirical formula, equation 2, was developed : $t = 10[D_{dc}/(D_o + D_r)]^2 + 1.75[D_{dc}/(D_o + D_r)] - 7$, where t is the average lifetime of the dies in hours and the bracketed term is the die combination ratio. This formula is somewhat inaccurate for A = 1 (one anvil), especially for long die lifetimes.

For the Crepusius denarii, D_{dc} is roughly 1040 ± 100 die combinations.[12] Because D_o is almost certainly 470 ± 10 dies and D_r is 515 ± 10

Die-Comb. Ratio vs. # of Dies in Box
(4 Anvils)

6 Hour Die Lifetime   12 Hour Die Lifetime
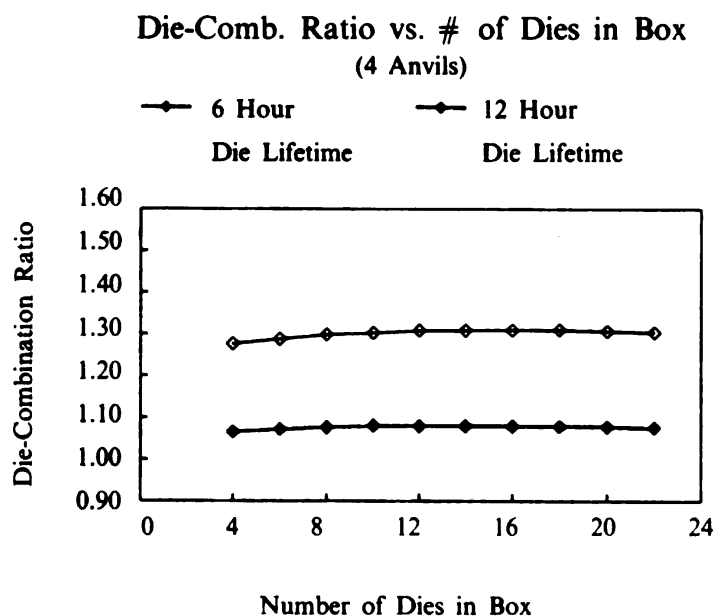
[12] This calculation may be low and is much less sure than the estimate of D_o or D_r for Crepusius denarii; when reverse dies were returned to the die box at night, the choice of reverse dies the next day for the various anvils was probably not random: the reverse dies from the previous day would more likely be chosen than other dies deeper in the box. This nonrandomness would cause the calculated average lifetime to be low.

Die-Comb. Ratio vs. Number of Anvils
(18 Dies/Box)

Number of Anvils

Die-Comb. Ratio vs. Avg. Die Lifetime
(4 Anvils)

Average Die Lifetime (Hours)
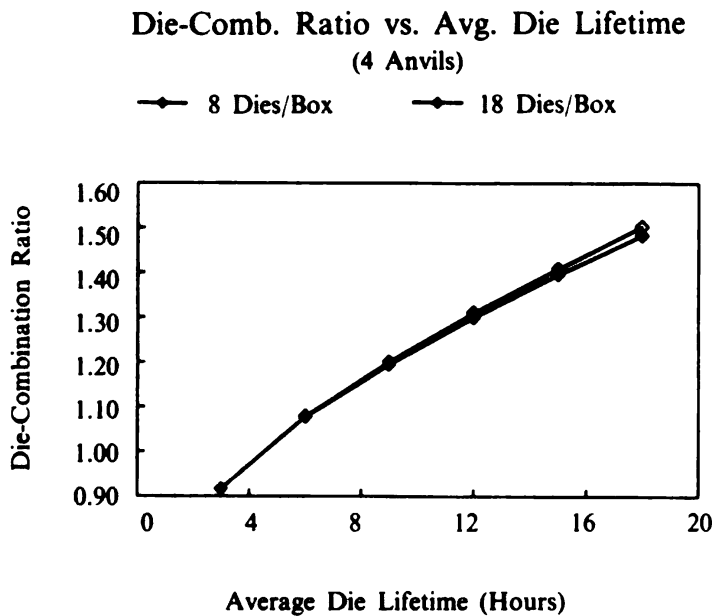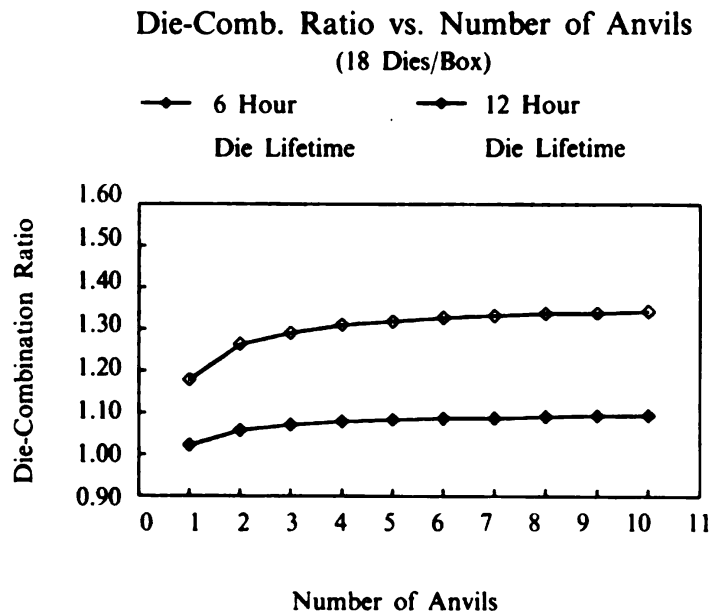
FIG. 2. The die combination ratio, $D_{dc}/(D_o + D_r)$, as a function of the number of dies in a box, the number of anvils, and the average die lifetime.
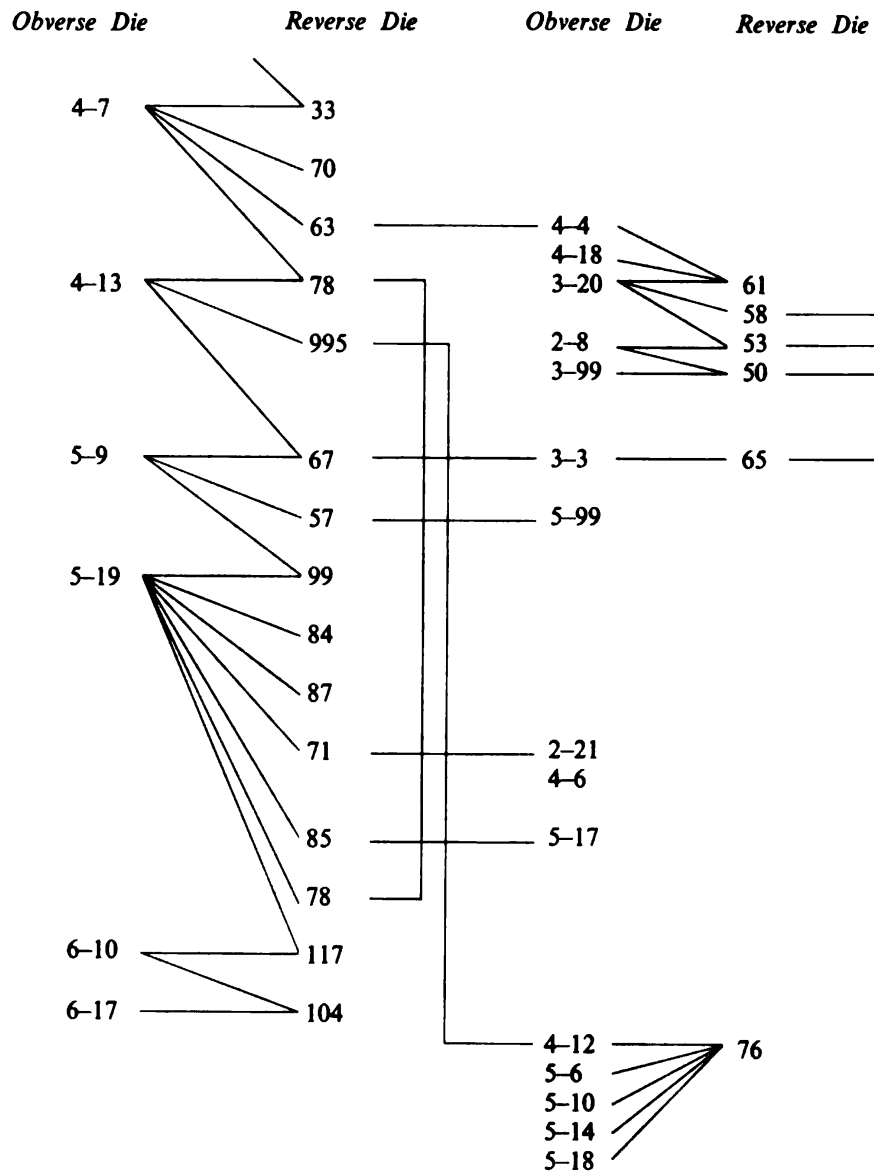
FIG. 3. Partial die linkage of Crepusius denarii showing return of reverse dies at night. Each reverse die connected to obverse dies in more than one column is assumed to have been returned to the die box at night.

dies, the value of the die combination ratio is between 1.00 and 1.18 for the Crepusius series. From Fig. 2 this indicates the average lifetime for Crepusius dies was five to ten hours (this assumes more than one anvil). Additionally, since the die combination ratio seems to be greater than one, dies probably were returned at night, at least some of the time. Die linkages for Crepusius coins prove that dies often were returned at night (see Fig. 3, constructed from Crepusius die link data, and the section on "Die Link Calculations"; from Fig. 3, for example, the reverse die 78 must have been returned to a die box at least once).

Because the equation for calculating t, the average die lifetime, only involves D_o, D_r, and D_{dc}, it should be possible to calculate the average die lifetime for any large issue of ancient coins. Die linkages show clearly whether the reverse dies, at least, were returned to the die boxes at night. For most issues of ancient coins we believe that the reverse dies were returned nightly to the die box because this practice would have been an effective security measure to prevent smuggling dies out of the mint.

CALCULATION OF THE NUMBER OF ANVILS

For a given issue of coins, the number of anvils, or workstations, is important because it bears on the operation of the mint, and particularly on the productivity. In addition to finding the mean value of delta, we have determined the standard deviation[13] of delta. In Fig. 4, we plot the standard deviation of delta against the number of anvils. We observe no obvious dependence upon the number of anvils (as was observed in Fig. 1 for mean delta). However, if we take the ratio of mean delta to the standard deviation of delta, which we define as the **mean delta ratio**, we find a clear dependence upon the number of anvils (see Fig. 5). For the Crepusius sample of 1,865 coins, the mean delta is 19.1 with a standard deviation of 15.8, leading to a value of

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[13] The standard deviation, s, is a measure of precision: it indicates the probable range within which a given value should be found. For instance, if there were 50 ± 5 dies, where s = 5, then there are two chances out of three that the true number of dies lies between 45 and 55 dies (50 ± s). There are 95 chances out of 100 that the true number of dies is between 40 and 60 dies (50 ± 2s).
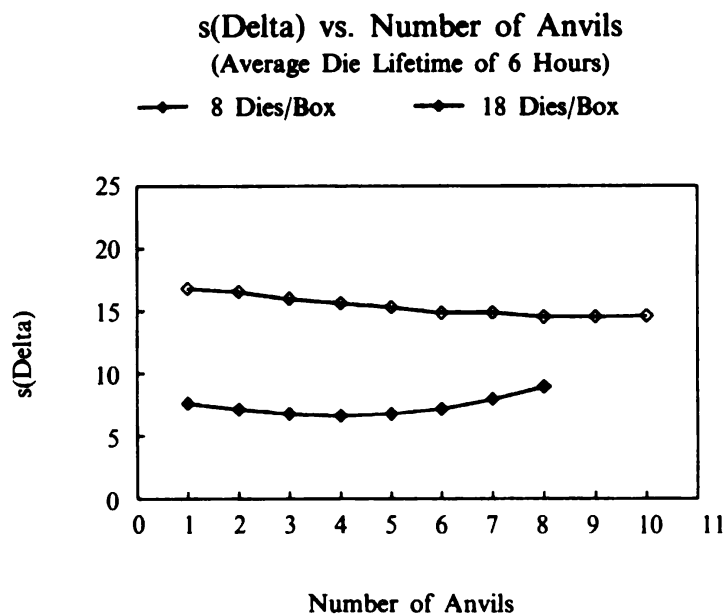
s(Delta) vs. Number of Anvils
(Average Die Lifetime of 6 Hours)

➤— 8 Dies/Box   ➤— 18 Dies/Box

Fig. 4. The standard deviation of delta as a function of the number of anvils.

Mean Delta Ratio vs. Number of Anvils
(18 Dies/Box, Approx. 500 Obverse Dies)

➤— 4 Hour   ➤— 6 Hour   ■— 12 Hour
Die Life   Die Life   Die Life
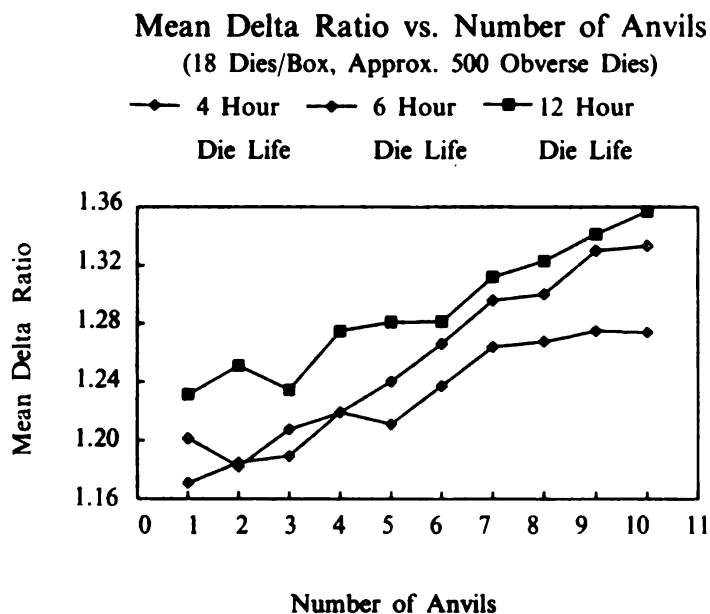
Fig. 5. The delta ratio, (mean delta)/(standard deviation of delta), as a function of the number of anvils. The number of obverse dies was held approximately constant at 500.

Die Fraction vs. Number of Anvils
(18 Dies/Box, Approx. 500 Obverse Dies)

—•— 127 Days   —•— 12 Hour

Die Lifetime
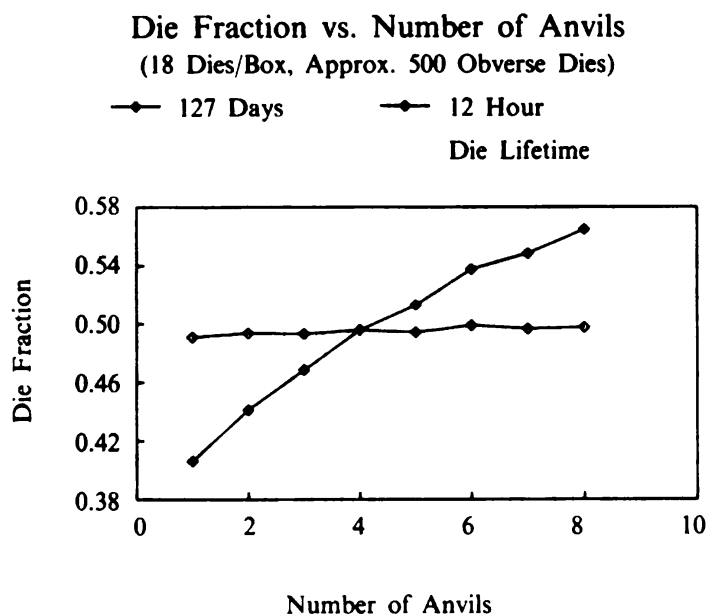
Number of Anvils

Fig. 6. The die fraction, (number of obverse dies, represented by coins, linked to two or more reverse dies)/D_o, as a function of the number of anvils. The number of obverse dies was held approximately constant at 500.

19.1/15.8 = 1.21 for the mean delta ratio. Using the lines corresponding to die lifetimes of 6 or 12 hours in Fig. 5, we conclude that there were fewer than 6 anvils, probably 1 to 4.

One other piece of information that we have from the Crepusius coin data is that 181 of the estimated 470 obverse dies are combined with two or more reverse dies (these are the dies that were used to determine the mean delta). This means that 38.5 percent of the estimated obverse dies are combined with multiple reverse dies. In Fig. 6, we plot the simulation results for this "die percentage" as a function of the number of anvils (with the number of days of operation or the die lifetimes chosen such that the number of obverse dies used was held constant at approximately 500). These results imply that only one or two anvils were in use.

DIE LINK CALCULATIONS

From 1,865 Crepusius denarii, a total of 115 die chains have been found, many of which involve repeated pairings of just one obverse and two or three reverse dies, or vice versa.[14] An example of a Crepusius die chain is given in Fig. 3. Some Crepusius die chains are very large. The largest die chain involves 693 coins, 124 obverse dies, 131 reverse dies, and 263 die combinations. In this die chain, reverse dies were returned to the die box at least 43 times, and possibly many more.

Carter's method[15] for calculating the original number of obverse and reverse dies utilizes the following equation: $D_o = (n \cdot d_o)/(1.069n - 0.843d_o)$ where D_o is the original number of obverse dies, n is the number of coins in the sample, and d_o is the number of obverse dies found in the sample of coins. This equation is valid when n/d_o is greater than 3; a slightly different equation is used when n/d_o is less than 3. For the above die chain involving 693 Crepusius coins, calculations indicate that $D_o = 135$, $D_r = 144$, and $D_{dc} = 356$. Note that D_o (and D_r and D_{dc}) in this calculation is the original number of Crepusius obverse dies in only a *portion* of the entire Crepusius series, namely comprising about one-third of the obverse groups. The calculated die combination ratio is $356/(135 + 144)$, or 1.28.

The second largest die chain involves 221 coins, 50 obverse dies, 61 reverse dies, and 114 die combinations, from which $D_o = 57$ (again D_o is the original number of Crepusius obverse dies in less than a tenth of the whole series), $D_r = 73$, $D_{dc} = 190$, and the die combination ratio $= 190/130 = 1.46$. The third largest die chain involves 96 coins, 17 obverse dies, 22 reverse dies, and 39 die combinations. The die combination ratio for this die linkage is 1.25. For the three largest Crepusius die chains, the corresponding average die lifetimes were calculated from Fig. 2 to be 11, 17, and 10 hours, respectively. The overall average is close to 12 hours.

Two factors affect the above calculation of average die lifetime, but in opposite directions. 1) Short-lived dies (of which many are still

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[14] A **die chain** is a series of obverse dies and reverse dies which are joined by sharing either obverse or reverse dies in common.

[15] Carter, "A Simplified Method," p. 202.

unrepresented by known coins), either obverse or reverse, usually produce only one die combination for each short-lived die. Usually, then, the unknown short-lived dies would lower the value of the die combination ratio, corresponding to a smaller calculated value for the average die lifetime. 2) When reverse dies were returned to the reverse die box over night, unless special effort was made, the same die could easily have been chosen the next day, by accident or on purpose, for work with the same anvil (i.e., the same obverse die). This reduces the number of die combinations that would have been obtained if the choice of reverse dies from the die box had always been truly random. If the choices had been random, the number of die combinations would have been higher, and the die combination ratio should be higher, indicating a longer die lifetime.

The relative effects of the two factors is unknown, but for a first approximation they may be considered to be about equal and therefore to cancel each other. If that is accepted, then very approximately the average die lifetime was about 10 to 12 hours for Crepusius dies. The estimated average obverse die lifetime was 515/470 times as long as the reverse die lifetime; if the average obverse die lifetime were about 12 hours, then the reverse die lifetime was about 11 hours. It is likely that dies used for striking other issues of Roman Republican denarii had similar lifetimes.

Using $t = 12$ hours and a total operating time, T, of 127 days times 12 hours/day $= 1524$ hours[16] and substituting into the appropriate equation, we have $A = D_o \cdot t/T = 470 \cdot 12/1524 = 3.7$ anvils. This number of anvils is probably precise only to ± 2 anvils because of assumptions that have been used. Combining this number of anvils with the calculation from the delta ratio, our best estimate is that 3 ± 1 anvils were used for the Crepusius series.

Interestingly, Buttrey[17] reasoned there were two anvils from the fact that two sets of obverse dies, engraved by different engravers, were in use simultaneously. This may possibly have been the case.

[16] Buttrey, "The Denarii," p. 101.
[17] Buttrey, "The Denarii," p. 101.

CONCLUSION

For the large series of Crepusius denarii, struck in roughly 125 to 130 working days in 82 B.C., the reverse dies were usually returned to the reverse die box at night. We calculate that the reverse die box contained an average of 18 dies (most probably 16 to 20), and the obverse die box probably was comparable in size. The average die lifetime of Crepusius dies was 9–12 hours (most probably within the range of 6 to 14 hours), and approximately 3 anvils were used (probably 2 to 4).

Much of the methodology developed here for Crepusius denarii should apply to many other series of ancient and medieval coins. Data from other series of coins need to be analyzed using the above equations, and extensive die link statistics should be collected for additional series of coins to test this methodology.

THE DISTRIBUTION OF THE NUMBERS
OF COINS STRUCK BY DIES

WARREN W. ESTY AND GILES F. CARTER

The number of coins struck before a die becomes unusable varies widely from die to die. Based on engineering principles it is likely that there is a single type of probability distribution for these numbers. Modern direct evidence from mint records and die-count data from issues of ancient coins are analyzed here in an attempt to determine the type of distribution and its variability.

Modern mint data show that modern methods of manufacture and quality control have not eliminated the variability. Figs. 1 and 2 contain data from the U.S. mint which show that while some dies produced over one million quarters, others produced fewer than 100,000.[1] It is certain that ancient dies also produced widely varying numbers of coins. This article will concentrate on determining the variability of the numbers of coins struck per die. All of the methods for estimating the numbers of dies used for an issue depend upon the variability of the assumed distribution for the numbers of coins struck per die.[2] Because different

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[1] G. E. Hunter, Department of the Treasury, the U.S. Mint, personal communication.

[2] W. W. Esty, "Estimation of the Size of a Coinage: A Survey and Comparison of Methods," *NC* 1986, pp. 185–215 (hereafter, Esty, "Survey"). See the equation below. The mean of the distribution, as opposed to its variability, does not matter. If the mean coin output were doubled and the survival rate (the fraction of coins which
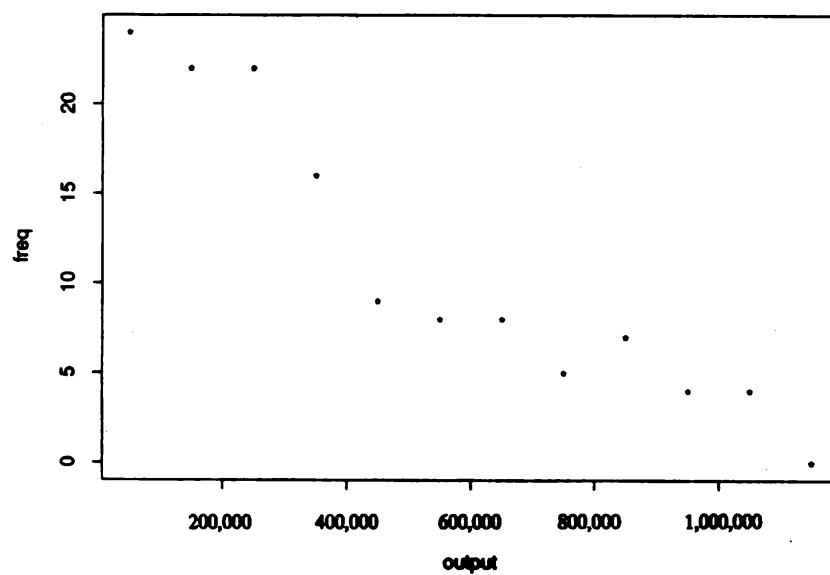
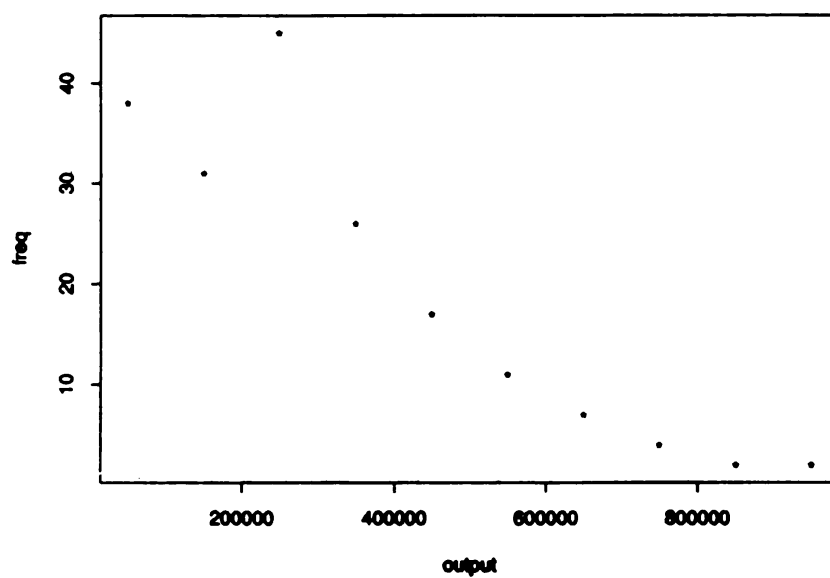FIG. 1: U.S. Quarter Obverse Output, Groups of 100,000

FIG. 2: U.S. Quarter Reverse Output, Groups of 100,00

mathematical assumptions yield substantially different estimates, it is important to determine the proper distribution to use.

If the mean number of coins struck per die were known, we could use estimates of the numbers of dies in an issue to estimate the number of coins in the issue. The size of an issue often was related to its purpose and having an estimate of issue size may enhance our understanding of why ancient states produced certain issues.[3] This article does not address the question of the mean number of coins struck by dies.

In a die study, the original observed data are the "multiplicities" of the dies, which are the numbers of coins in the sample from each represented die. These yield the die "frequencies" which are the numbers of dies represented in the sample exactly once, twice, three times, etc. These frequencies are identified as f_1, f_2, f_3, etc. For example, $f_2 = 15$ means that 15 dies were each represented by exactly 2 coins. Note that the number of unrepresented dies, f_0, is not observed and is, in fact, just what we want to know when we are interested in the number of dies used to strike an issue.

Graphs 3 through 15 plot the data from several issues using fs to mark the observed frequencies. Since f_0 is not observed, there is no f plotted above 0, and the objective is to estimate the unknown value of f_0. This can be done by eye by fitting a crescent-shaped or one-humped curve through the plotted fs. Statisticians know that "eyeballing" the data is always a good idea. Beyond that, however, we seek to discover what, if anything, all these graphs have in common so that a formula can be established for more rigorous estimates with confidence intervals.

Graphs 3 through 15 also plot smooth, calculated curves using the # symbol. The sample frequencies marked f can be regarded as resulting from random (or non-random) fluctuations about some true average curve. On each graph the # curve is one of the possible true average curves (see "Fitting the Data" for the mathematical source for these

survive to be sampled) halved, the effect on the distribution of samples would be nil. Since we do not know the survival rate, the mean output cannot be determined from extant samples alone. For references about the mean coin output see nn. 9 and 10 of "Survey."

[3] M. H. Crawford, *Roman Republican Coins* (Cambridge University Press, 1975), p. 694. H. B. Mattingly, "Coinage and the Roman State," *NC* 1977, pp. 199–215.
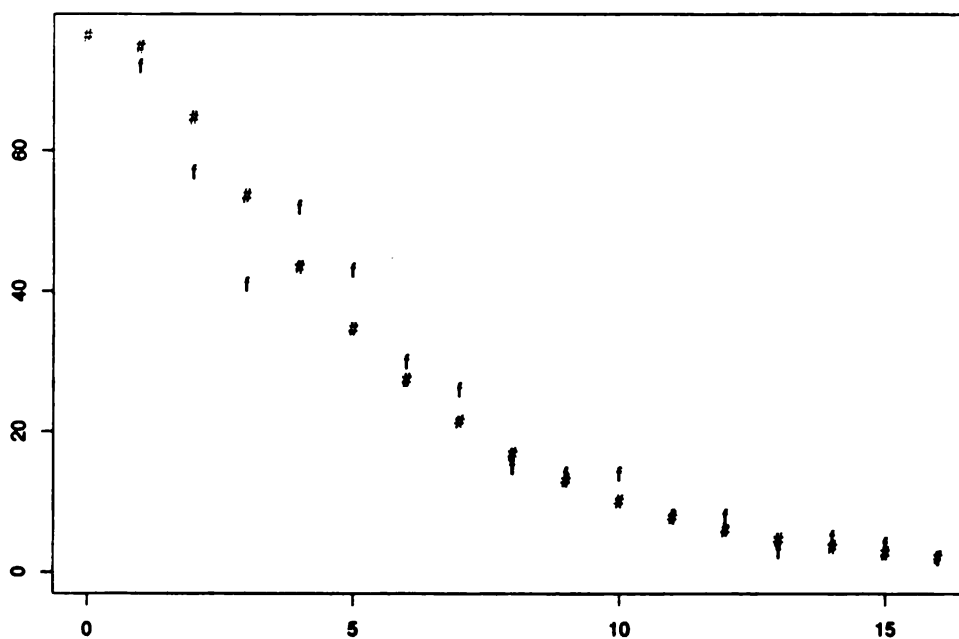
Fig. 3: Crepusius Obverses, $k = 1.3$
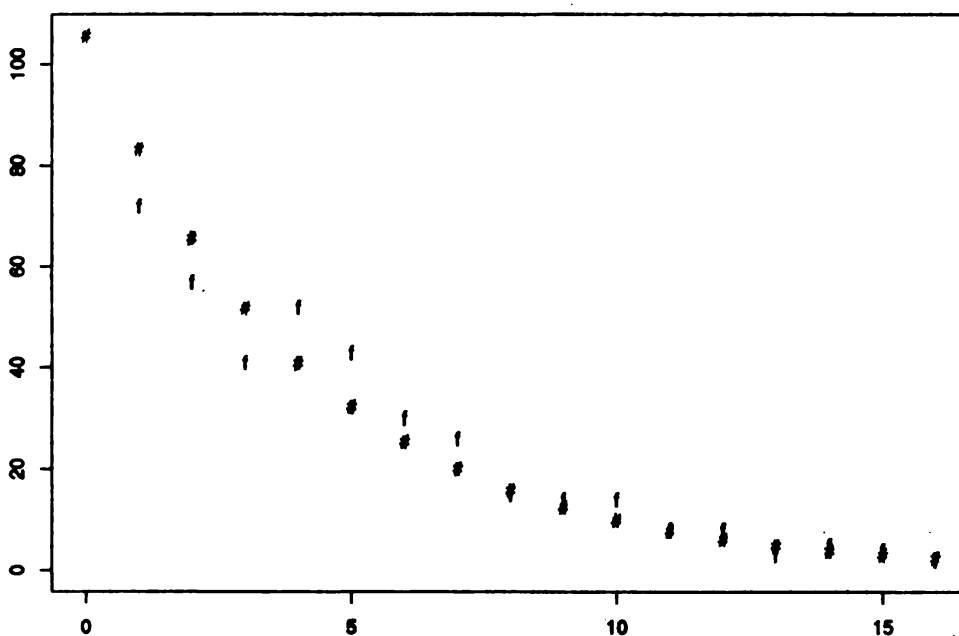
Fig. 4: Crepusius Obverses, $k = 1$

curves). The height of the $\#$ mark above 0 gives an estimate of the number of unobserved dies. The plotted curves are selected from a family of theoretically justified curves in an attempt to find the most accurate parametric model and arrive at the best estimator. We think we have found a good model, but we do not argue here that we have necessarily found the precise parametric model.

Some of the curves fit the frequency data fairly well (e.g. Figs. 3, 6, and 7). Others do not because the frequency data are too irregular (e.g. Fig. 8). With random samples we expect some differences between the f plot and the best fitting $\#$ plot. If samples from various issues cannot be consistently fit with the assumption of a common distribution three possibilities must be considered: 1) there may not be a common distribution; 2) the samples may not be random, or 3) the samples may be random, but unusual, as random samples occasionally are.

Since dies usually fail unpredictably by brittle fracture, there should be, according to the principles of engineering, a common distribution for the numbers of coins struck by dies. Obviously, the dies for different coin issues (separated in space or time) were made from different batches of metal with differences in processing. If these differences affect only the mean coin output and not the relative variability, we would expect to find a common distribution, adjustable for the mean. A less stringent assumption is that there is a common *family* of coin output distributions, also adjustable for the variability. It is this latter assumption which we examine to attempt to determine a common variability parameter.

Within a single issue, metal processing variations could have an observable effect. If groups of dies were made from different batches of metal having different casting temperatures or varying impurities, some batches of dies with inferior metal would have lower lifetimes. Such a batch would increase the variability of the coin output distribution for that issue and would inflate the numbers of unobserved dies and singletons (f_0 and f_1). Perhaps such an effect is in operation somewhere in the data analyzed below, but we cannot tell. We hypothesize a common family of distributions and hope to find a single common variability parameter.

The second possibility is that the samples are not necessarily random. Although there is some evidence that coin samples may be
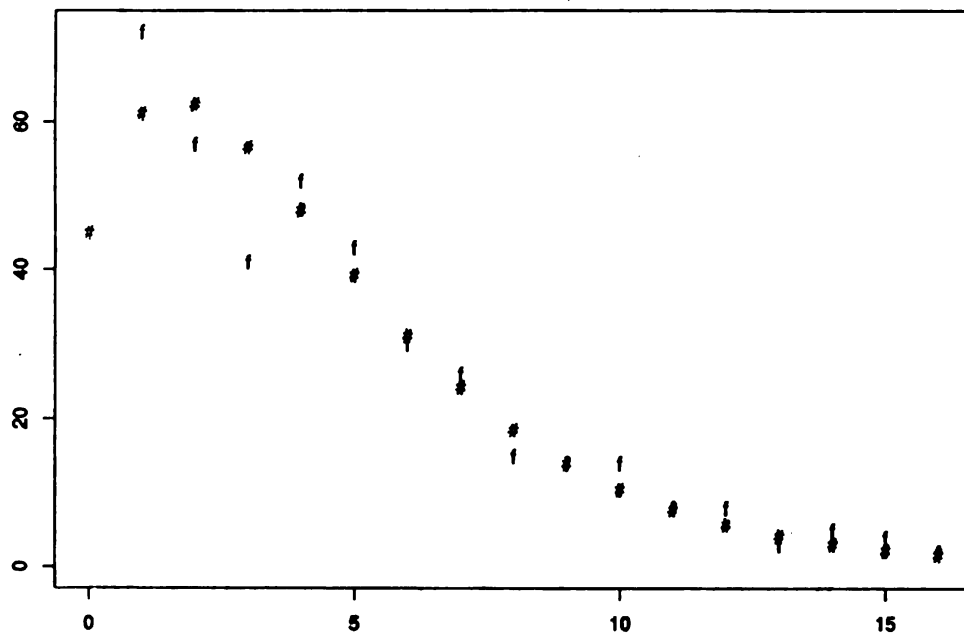
FIG. 5: Crepusius Obverses, $k = 2$
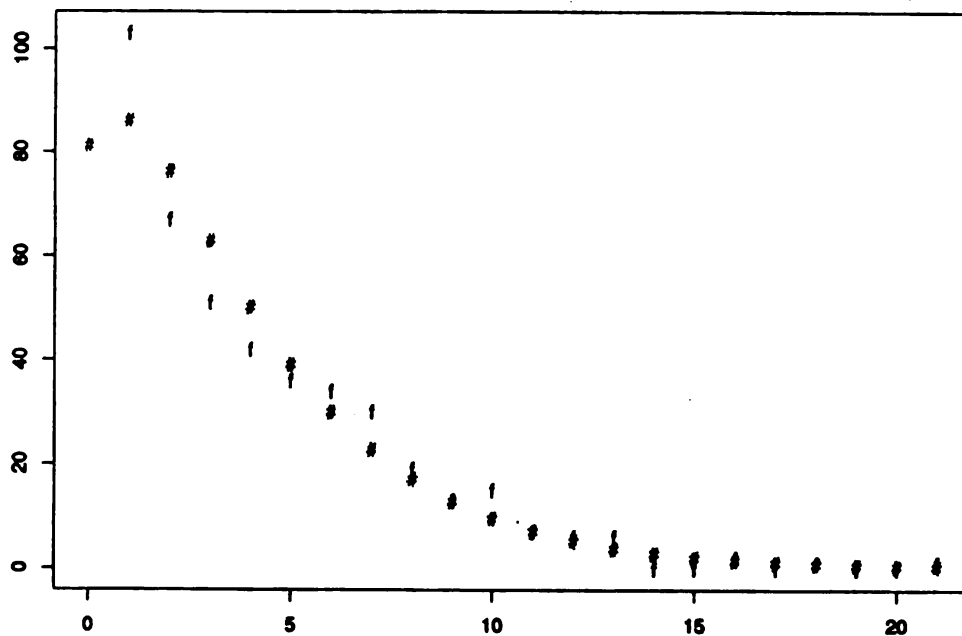
FIG. 6: Crepusius Reverses, $k = 1.5$

random, there are some samples which are clearly not random.[4] Groups of coins which were produced together might stay together until deposited in a hoard. This effect could substantially change die number estimates and invalidate inferences based on random samples. Another obvious possibility affecting randomness is that collectors often intentionally avoid die duplicates, especially when dies are distinguished by control marks. When scholars seek to assemble a corpus, collectors may report on the contents of their collection, which will then underrepresent duplicates and thus inflate the number of singletons. An even stronger non-random effect occurs when collectors report only the previously unlisted varieties they posses. Then the duplicates they possess, which are so necessary for determining the proper frequencies, will be uncounted.

For these reasons we could argue that the number of singletons, f_1, may be greater in a sample which is a corpus than would be determined by any theoretical "best fitting" distribution. It is noteworthy that very similar estimation problems occur in ecology (in estimating the number of unobserved species) and in "author's vocabulary" studies.[5] In both applications singletons (corresponding to rare species or words rarely used) occur far more frequently than is easily explained with the known probability models. The coin output model discussed here is not identical to those models—in the numismatic model there is greater justification for expecting a common output distribution—but the phenomenon of large numbers of singletons is seen in all three applications. Inspection of Figs. 5, 6, and 8–15 reveals that the number of singletons (f_1) is often above the best fitting smooth curve.

FITTING THE DATA

Among all families of distributions which could be expected to model the numbers of coins produced by dies, the negative binomial family

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[4] B. Thordemann, "The Lohe Hoard: A Contribution to the Methodology of Numismatics," NC 1948, pp. 188–204 at pp. 201–4 presents the classic case which appears random. In the present article, the Bursio denarii data appear to be non-random. The effect of non-randomness on estimates and an estimator which is less sensitive to non-randomness are discussed in Esty, "Survey."

[5] S. Engen, Stochastic Abundance Models (Chapman and Hall, 1978), surveys these fields.
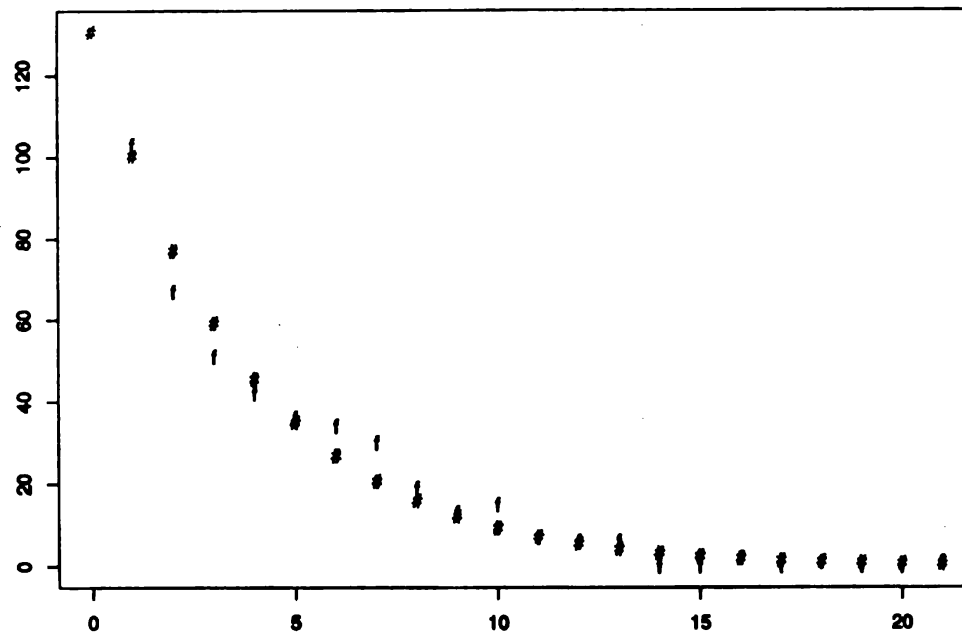
FIG. 7: Crepusius Reverses, $k = 1$
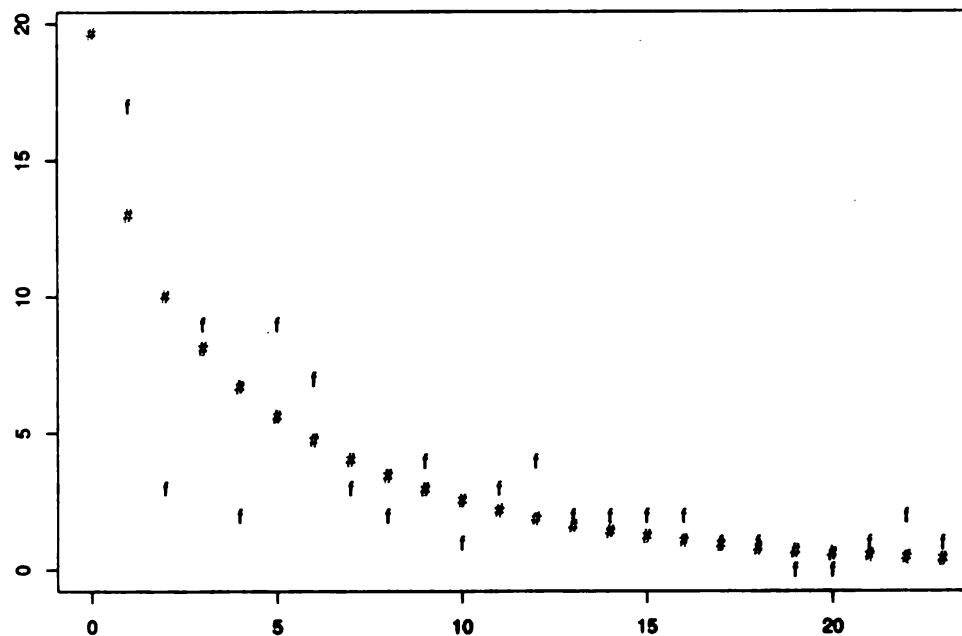
FIG. 8: Bursio Reverses with Numerals, $k = .75$

stands out as an obvious candidate.[6] The primary reason is that it is often used in engineering to model failure times, and it includes the geometric distribution which corresponds to a uniform failure rate. It is a two-parameter family. One parameter can be adjusted to fit the mean number of coins produced and the other can be used to describe the shape (variability) of the distribution. Another reason for selecting this family is that random sample frequencies have a negative binomial distribution with the same shape parameter, so data from samples will reflect the parameter we want to know, that is, the variability of the original output.

The shape (variability) parameter, k, is important because estimates of the true number of dies using die count data rely on the assumed value of k (but not on the mean).[7] We are analyzing die data from several issues of coins in order to attempt to answer two questions. 1) Is there a single shape parameter value for all issues? 2) If there is a single parameter value, what is it?

Since the number of dies represented by zero coins is not observed (we do not know f_0), f_1, f_2, f_3, etc. would have a zero-truncated negative binomial distribution. The sample mean is used to determine the mean of the fitted distribution; various possible shape parameters are considered in an attempt to match the variability of the data. The distribution will not have the appearance of a bell-shaped, normal (Gaussian) curve. It will be skewed to the right with a long tail to the right. It may have one hump (e.g. the ⌗ plot in Figs. 5 and 13), but often starts out highest at the left and tails off downward with no hump (e.g. the ⌗ plot in Fig. 4).

The shape parameter, k, may vary between zero and infinity and is a measure of the variability. Lower values of k correspond to more variable numbers of coins per die. Shape parameters substantially greater than 2, say $k = 4$ or greater, correspond to a rather uniform distribution in which there would be a strong tendency for die lifetimes

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[6] The distribution gives a mathematical formula, with two parameters, for the probability that a given die produces x coins. It is described in most mathematical statistics books, for example, R. Hogg and A. Craig, *Introduction to Mathematical Statistics* (New York, 1978).

[7] See equation below.
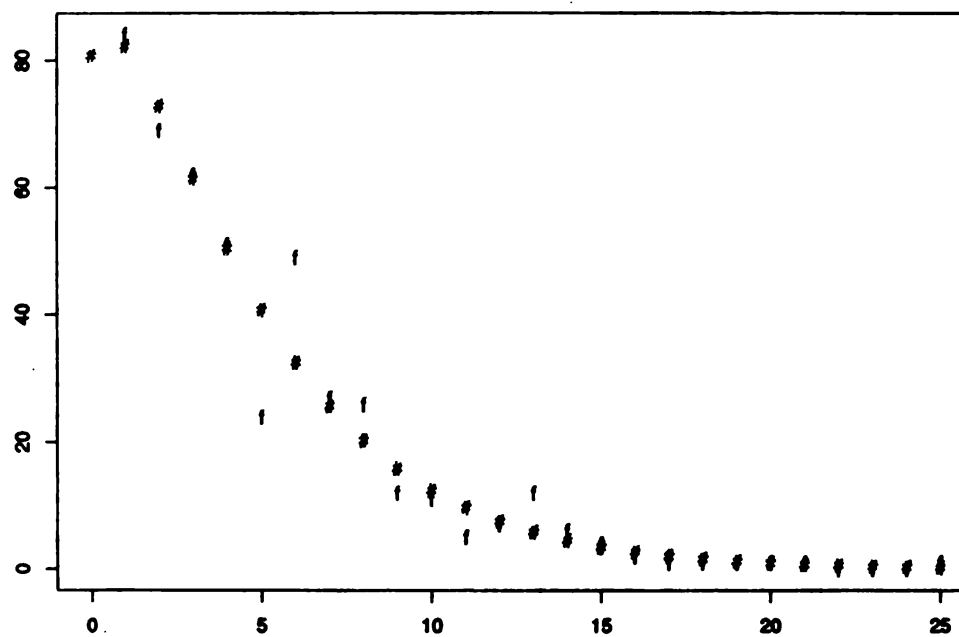
FIG. 9: Bursio Obverses, k = 1.35
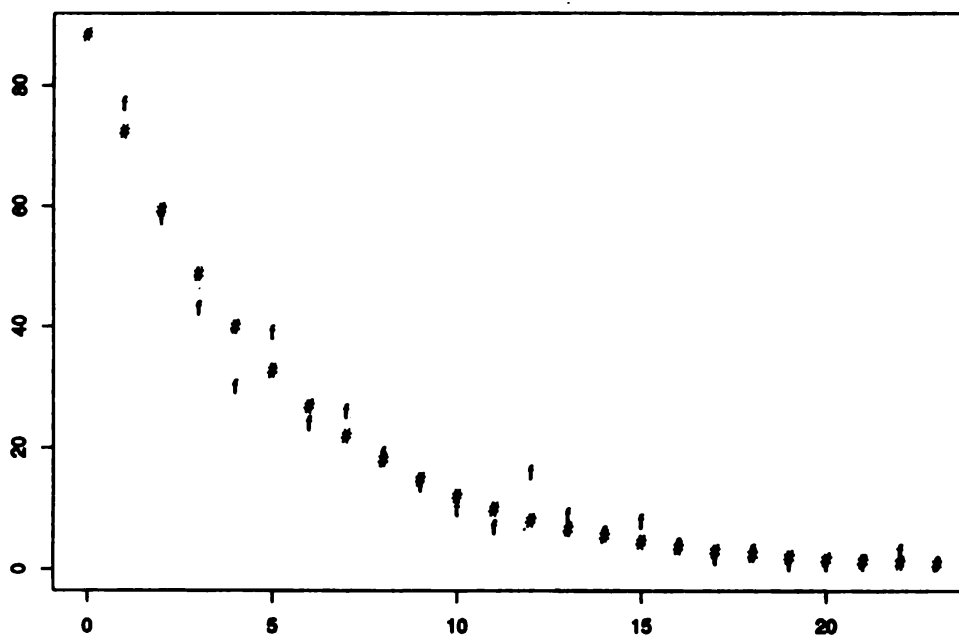
FIG. 10: Bursio Reverses, k = 1.0

to cluster about the mean value. The data show that there is no such strong central tendency. The data also show that the extreme variability represented by $k < 1$ is also unlikely. $k = 1$ corresponds to a geometric or exponential die lifetime, with outputs which are quite variable: 20 percent of the dies are discarded before producing even one-fourth the mean number of coins, and 12 percent producing at least twice the mean number. The data show that values of k between 1 and 2 are most likely for the distribution of the numbers of coins struck by dies.

For a given value of k, if d distinct dies are represented in a random sample of n coins, the estimate of the original number of dies is then given by the solution, x, to[6]

$$x = \frac{d}{1 - (1 + \frac{m}{xk})^{-k}}$$

The Table shows the effect of various values of k on the estimates in a few representatives cases.

TABLE

Estimates of the Number of Dies for Various Values of k and d, with Sample Size $n = 100$.

$k =$	1	1.25	1.5	1.75	2	3	∞
$d = 30$	42.9	40.2	38.5	37.4	36.5	34.6	31.3
$d = 70$	234	213	199	189	182	165	131
$d = 90$	900	815	752	710	683	610	466

Lower values of k produce higher estimates of the number of unobserved dies, and $k = \infty$ corresponds to the unrealistic, but

[6] Esty, "Survey," p. 205, H2. Note that x appears on both sides. This equation may be solved by guess-and-check (successive approximation). Another, nearly equivalent approach to estimating the number of dies is to solve A1 (p. 199) and use its solution for k' in H5 (p. 205) to obtain an estimate adjusted for the shape parameter (p there, k here). Confidence intervals follow from solving A2 (pp. 199–200) [exp($-n/d$) in A2 is a misprint for exp ($-n/x$)] for the endpoints and using H5.
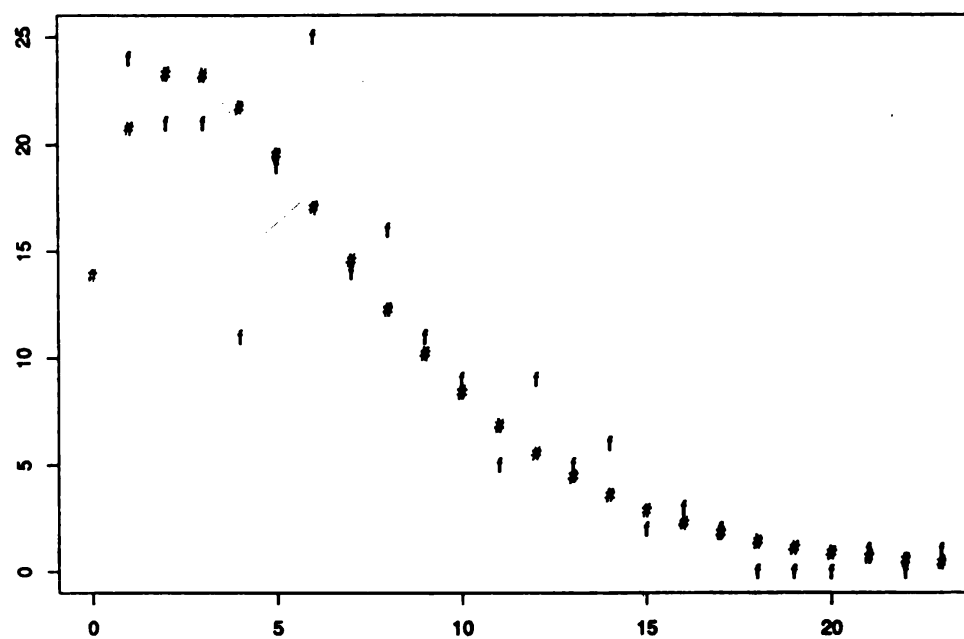
FIG. 11: Frugi Obverses, $k = 2$
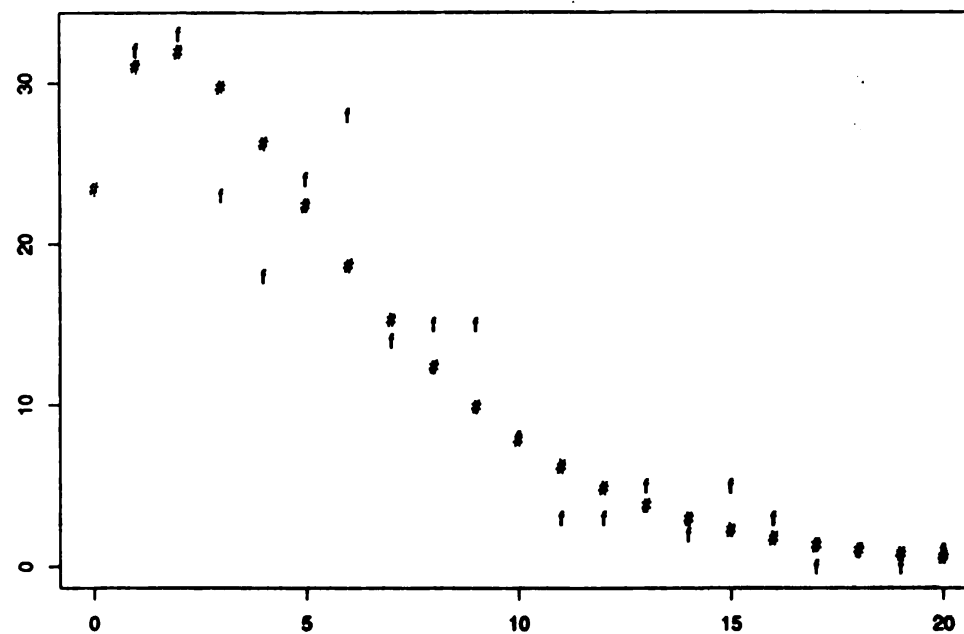
FIG. 12: Frugi Reverses, $k = 1.8$

interesting, assumption that all dies produced equal numbers of coins. Estimates depend upon the ratio, n/d, of the number of coins, n, to the number of different dies observed, d. The Table uses the convenient sample size $n = 100$ so it is easy to see the effects. Intensive sampling might yield an average of more than 3 coins per die; $d = 30$ is an example ($n/d = 3.33$ coins per die). The "equal output" ($k = \infty$) estimate of the true number of dies would be 31—only one missing! But this is unrealistic. Lower values of k permit more room for rare unobserved dies; for example, the realistic $k = 2$ suggests 6 or 7 dies may be missing.

If an issue were produced by many hundreds of dies, a sample size of 100 coins would be relatively small and the sample would barely begin to produce duplicates. The true number could not be estimated with much accuracy and wide confidence intervals would tell us that: $d = 90$ is an example ($n/d = 1.11$ coins per die). The estimates vary substantially depending upon k.

An intermediate case is given by $n = 100$ and $d = 70$ where about one-third of the dies are represented in the sample. We will see that both $k = 2$ and $k = 1.5$ are realistic values. The change in estimate from $k = 2$ (182 dies) to $k = 1.5$ (199 dies) is not very important, given the wide confidence intervals.

It is important that the differing estimates refer to numbers of dies and not directly to the total volume of coinage. In the model of coin production, lower values of k correspond to more dies which broke early and produced few coins. If we base our estimator on a lower k value, we inflate the estimated number of unobserved dies, but most of the increase in the estimate consists of dies which produced relatively few coins. Thus, as k decreases, the estimated volume of coinage also increases, but proportionally much less than the estimated number of dies increases.

There is a method of estimating the volume of coinage without first concentrating on the number of dies.[9] But we are counting dies and it is natural to estimate the true number of dies. Estimates based on uniform coin output distribution ($k = \infty$) are likely to seriously underestimate the true number of dies. As can be seen in the Table, the choice

[9] Esty, "Survey," pp. 188–90, section 3.
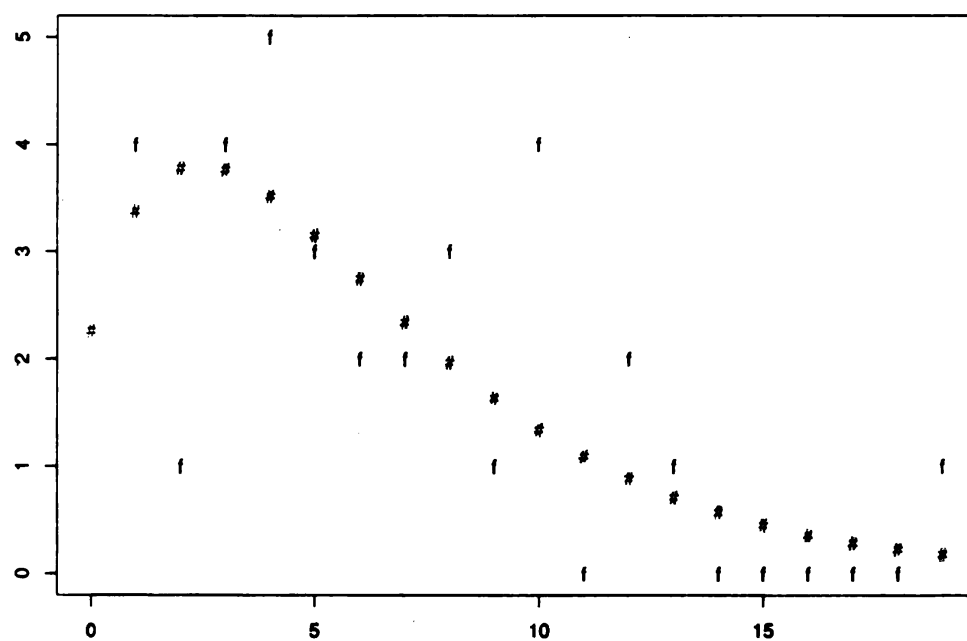
FIG. 13: Second Century B.C. Tetradrachms, $k = 2$
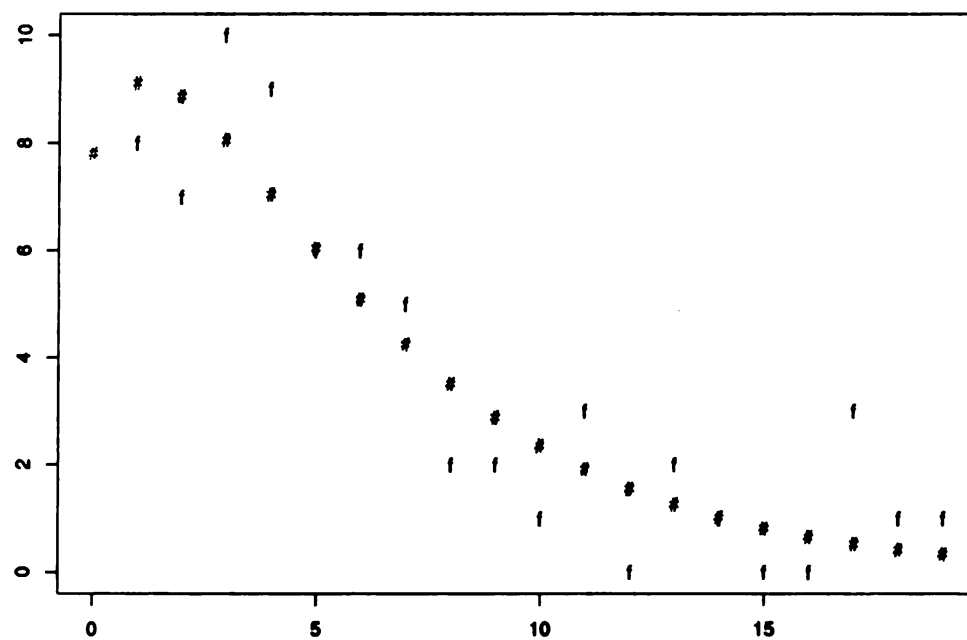
FIG. 14: Elizabeth I Sixpence Obverses, $k = 1.5$

of which k to use for the estimator is important. The smooth curves labeled with # in Figs. 3 through 15 are all produced under the assumption that the true distribution is negative binomial. The object is to settle on a "best" value for k.

For any value of k, the equation can be solved for x by guess-and-check. The case $k = 2$ has been closely studied and yields an explicit solution.[10] The parameter 2 is mathematically convenient and it appears to perform well in estimation under a variety of sampling conditions.

In the model, samples from the distributions with lower values of k (higher variability) should usually contain many singletons as well as some dies which should be represented many times. Unfortunately, this same effect can appear due to non-randomness when many coins struck from the same die stay together. If the two cases can be distinguished at all, it is because truly random data should exhibit a good selection of intermediate multiplicities. For example, if there is a die which yielded 20 or more coins, there should be several dies which yielded between 10 and 20 coins. If not, it may be suspected that the group of 20 coins is not random.[11] Values of k higher than about 4 would be displayed in the data by frequencies which appear to be nearly Poisson distributed.[12]

Müller and Stam both considered using each data set to estimate its own k and then using that k in the die number estimate (the equation above), rather than fixing k in advance as we advocate.[13] Müller's

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[10] G. F. Carter, "A Simplified Method for Calculating the Original Number of Dies from Die Link Statistics," *ANSMN* 28 (1983), pp. 195–206, used computer simulation to derive an estimator for the number of unobserved dies based on an assumption equivalent to assuming the shape parameter is 2. Esty, "Estimation of the Number of Classes in a Population and the Coverage of a Sample," *The Mathematical Scientist* 10 (1985), pp. 41–50, derived equation 1. For $k = 2$ the estimated number of dies is given explicitly by $2nd/[n - 4d + (8nd + n^2)^{1/2}]$. Relative coin outputs of 25 dies with $k = 2$ are given in Esty, "Survey," p. 212, Appendix 4.

[11] The Bursio data discussed below and the Bar Kochba data mentioned in n. 26 appear to exhibit substantial non-randomness.

[12] The Poisson distribution is discussed in almost all probability books and in Esty (above, n. 10, "Estimation"), n. 10.

[13] J. Müller, "Estimation du nombre originel de coins," in *Statistics and Numismatics*, eds. C. Caracassone and T. Hackens (Strasbourg, 1981), pp. 157–72. A. J. Stamm, "Statistical Problems in Ancient Numismatics," *Statistica Neerlandica* 41 (1987), pp. 151–73.
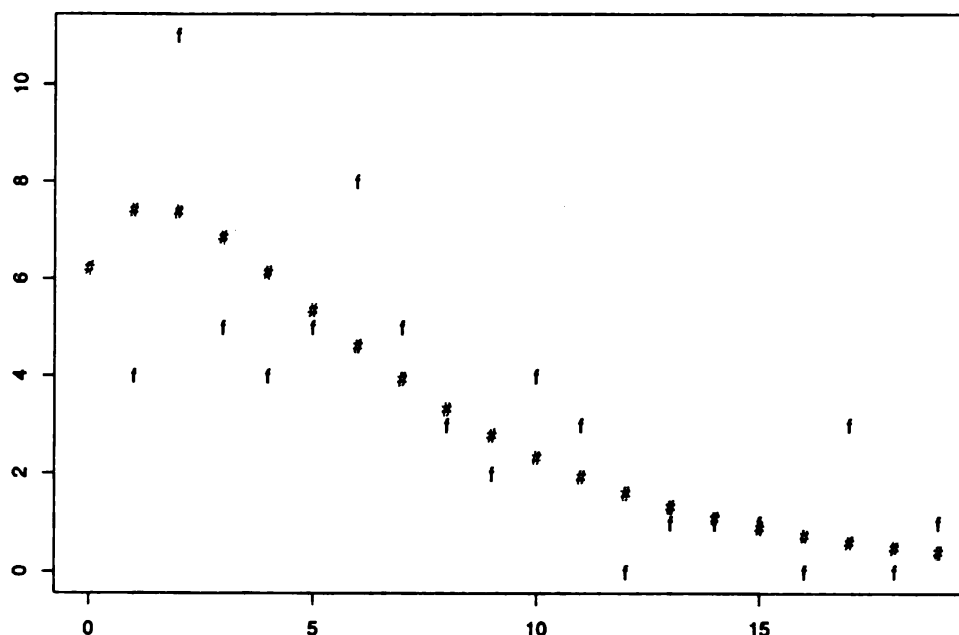
FIG. 15: Elizabeth I Sixpence Reverses, $k = 1.5$

method used the "method of moments" to fit the mean and variance of the zero-truncated distribution. Stam considered other methods including maximum likelihood and found similar estimates. Together these methods will be called "traditional" as opposed to the graphical approach employed here. Unfortunately, traditional methods of fitting a shape parameter give as much importance to individual dies represented many times as to singletons and doubletons, which are more relevant. The graphical approach used here avoids that problem. Inspection of the graphs shows that the change in fit of the dies represented 4 or more times due to a change in k from 2 to 1.3 is barely noticeable (Figs. 4 and 3), whereas the change in fit of the dies represented once or twice (and, most importantly, zero times) can be dramatic. Curves which fit the important Crepusius data with various values of k are illustrated (Figs. 3 to 7). The important fact that lower values of k yield higher expected numbers of singletons and unobserved dies may be seen easily.

The traditional methods of finding a confidence interval for k yield a wide range of shape-parameter values which are compatible with the

data. In other words, no one data set is likely to estimate k accurately. Unfortunately, the estimate of the zero frequency is strongly dependent upon the choice of k when k is less than 2 (see the Table above). This means that using the data set itself to estimate k and then using that estimated value of k to estimate the number of unobserved dies will yield erratic results.[14] Therefore it is preferable to determine a common value for k across all issues, if one exists, and to use that value in the estimator. That is why we are analyzing 12 data sets.

Note that the vertical scale of the graphs is important. If the frequencies are small, their relative variability is much higher. Thus vertical deviations from a smooth curve are far more significant if the vertical component is 40 than if it is 4. For example, we can expect a fit for the Crepusius reverse data (Fig. 7 with a vertical scale up to 120) which looks better than a fit for the Frugi obverses (Fig. 11 with a scale up to only 25), and in turn, we can expect the fit for them to look better than the fit for the Elizabeth I sixpence obverses (Fig. 14 with a scale up to 10) or the tetradrachms (Fig. 13 with a scale up to only 5).

The fit, and thus our confidence in the model and the shape parameter, depends upon *all* the frequencies, not just the total number of coins, n, and the number of different dies observed, d. Our ability to detect non-randomness which might invalidate our estimates depends upon all the frequencies. Therefore, die count researchers should report all the frequencies and not just n and d.

THE DATA ANALYSIS

The U.S. mint has supplied information on the number of dies used to strike quarters during February 1987 (see Figs. 1 and 2).[15] The 129 obverse dies produced from 1 to 1,322,000 coins: the mean output per die was 380,000, and there were numerous very low numbers struck per die—e.g. 700, 700, 1500, and 1900—and numerous high numbers struck per die—4 dies produced more than 1,000,000 coins. There was a broad representation of intermediate values. The reverse numbers were

[14] Esty (above, n. 10), pp. 46–48.
[15] Hunter (above, n. 1).

similar. From 184 reverse dies the output ranged from 1 to 2,235,000 coins per die (and only one die struck more than 1,000,000 coins), again with a good representation of intermediate values. In these two cases we can fit the negative binomial model without truncation and $k = 1.91$ for the obverses and 1.76 for the reverses.[16]

The most illuminating data set from ancient coins is that of the Roman Republican denarii of the moneyer P. Crepusius, 82 B.C. (see Figs. 3–7).[17] Because of control marks on the obverses and Roman numerals in sequence on the reverses, we can estimate the original numbers of obverse and reverse dies to within 5 or 10. Reverse numbers from 1 to 519 suggest 519 reverse dies but, considering accidental duplicates and apparently omitted sequences, the "best guess" is probably about 512. The "best guess" for the obverse die total is about 467, although it could be 470 or even 475. The plotted data reflect a sample size of 1,865 obverses from 394 different dies and 1,869 reverses from 433 different dies.[18] Thus the number of unobserved obverse dies should be about $467-394 = 73$ and the number of unobserved reverse dies about $512-433 = 79$.

Inspection of the Crepusius obverse frequencies shows that f_3 is out of line with f_2 and f_4 so we cannot expect any distribution to give a uniformly good fit (Fig. 3). This particular low frequency reflects either accidental random variation or non-randomness. The Müller method (see n. 13) of estimating k yields 2.28, but the corresponding fit of the low multiplicites is poor. Using $k = 1.3$ (Fig. 3) gives the f_0 estimate we are looking for (the zero-frequency estimate is given by the $\#$ symbol above 0 on the horizontal axis) and the theoretical curve (plotted with $\#$) appears to fit the multiplicities 1 to 5 fairly well. The plot for $k = 1$ (Fig. 4) is similar but yields a higher estimate for the number of

[16] The reverse die which produced over 2,000,000 coins has a large influence on the estimate for the reverse k. If it were discarded, which would not be proper, the estimate for k would increase to 2.25.

[17] Gathered by T. Buttrey, G. Carter, and C. Hersh. For an early analysis of it when the sample size was much smaller see Carter, "Comparison of Methods for Calculating the Total Number of Dies from Die Link Statistics," in *Statistics and Numismatics* (above, n. 13), pp. 204–13.

[18] The frequencies (f_1, f_2,...) are (71, 58, 41, 52, 43, 30,...) for obverses and (103, 67, 51, 42, 36, 34, 30, ...) for reverses.

unobserved dies. The plot for $k = 2$ (Fig. 5) yields a distinctly lower estimate for the number of unobserved dies. The lack of fit of the lower multiplicities is evident, but the fit of the higher multiplicities remains similar. Clearly the lower multiplicities are more relevant to an estimate of the number of unobserved dies.

Inspecting Figs. 6 and 7, the Crepusius reverse graphs, none of the frequencies appears out of line, although in Fig. 7 the slope of a smoothly fitting curve would be very steep at multiplicity one. Projected toward multiplicity zero, the zero-frequency estimate might be huge. Using $k = 1.5$ (Fig. 6) approximates the data although a smaller value for k, e.g. $k = 1$ (Fig. 7), fits the multiplicities 1 to 5 better.

Esty proposed a method of estimating f_0 which converted an estimate of the coverage (which is more "robust," i.e. less sensitive to non-randomness than other estimators) to a negative binomial estimate of the number of unobserved dies.[19] The conversion depends upon the choice of k: $est(k) = (d + n/k)/C - n/k$, where d is the number of distinct dies observed, n is the number of coins in the sample, and C is the coverage estimate, $C = 1 - f_1/n$. With the Crepusius obverse data $f_1 = 72$, $f_2 = 57$, $d = 394$, and $n = 1,865$. The $k = 2$ estimate is 447.3, below the desired 467, although 467 is inside the 95 percent confidence interval. If we select k to obtain an estimate of 467, k would be 1.31. For the Crepusius reverse data $f_1 = 103$, $f_2 = 67$, $d = 433$, and $n = 1,869$. The $k = 2$ estimate gives 512.8, right at the posited 512.

The Crepusius data, which are the best available from antiquity, support the use of the negative binomial model with $k = 2$ or k somewhat smaller.

De Ruyter collected die count data from the Roman Republican issue of L. Julius Bursio, and Stam used those data as an occasion to discuss theoretical statistical issues including how to estimate the parameters and the numbers of unobserved dies.[20] As in the Crepusius series, the die counts were particularly easy to obtain because of control marks which serve to differentiate the dies. One subseries even has Roman numerals on the reverse. They apparently run from 1 to 146, but

[19] Esty (above, n. 10) and "Survey," p. 209, Appendix 2k.
[20] Stam (above, n. 13), pp. 56–71.

inspection of the original counts-per-numeral data in Stam's table 3 shows that something is strange about the higher numerals. Two long runs of missing high numerals occur and the frequencies of the higher numerals are markedly lower than those of the numerals below, say, 125. This indicates either a non-random part of the sample or errors by the mint staff or changes in coin output from the later dies. Thus the data were looked at three ways: 1) as a whole, with and without numerals; 2) with only numerals, and 3) with only the first 100 numerals.[21]

Another oddity about the data can be seen in Fig. 8 which plots the frequencies among the first 100 numerals. The plot is irregular, and f_2 is low, f_3 is high, f_4 is low, f_5 is high and f_6 is again high. The fluctuations seem a little too large to be typical. This could indicate non-random data, but may be due to the usual random variation to be expected with low frequencies. Obviously, no smooth curve can fit the frequencies. This would not be evident in a traditional analysis which merely determined the estimated value of k. (Note in Figs. 9 and 10 that the complete data set yields a much smoother set of frequencies.) To obtain the zero-frequency (in this case f_0 is known to be 22) with the first 100 numerals, a k value of about 0.75 works best, but nothing will make f_2 and f_4 fit.[22] To fit the multiplicities 1 to 5, $k = 0.5$ appears to work better. This data set with numerals, large as it is, still is not as useful as might be expected and it does not give results consistent with the complete data set. It seems likely that the data exhibit some non-randomness.

The entire Bursio data set, based on 2,232 obverses and reverses, was also analyzed. The true numbers of obverse and reverse dies are not known, but the fit of the zero-truncated negative binomial can be investigated. . Estimated values of k for the complete set of obverses are between 1.38 and 1.56, depending upon the method used. The estimates for the reverse value of k are between 0.84 and 1.35.[23] Graphically

[21] Arbitrarily, 100 was chosen as a round number which avoids the numerals which appear to be missing or underrepresented in a non-random manner. As it turns out, the first 100 have strong indications of nonrandomness also.

[22] The frequency data for the numerals 1 to 100 is (f_0 = 22, 17, 3, 9, 2, 9, 7, 3, 2, 4, 1, 3, 4, 2, 2, 2, 2, 1, 1, 0, 0, 1, 2, 1).

[23] Stam (above, n. 13), p. 160, tables 7 and 8.

(Figs. 9 and 10) it is clear that lower values of k fit the low end better; k = 1.35 looks good for the obverses and k = 1.0 for the reverses. The difference is that the obverses have higher counts at intermediate multiplicities (particularly 6 and 8) which raise the parameter value.

The third data set consists of a sample of 1,301 obverse and 1,283 reverses of Roman republican denarii struck by C. Calpurnius Piso L. F. Frugi.[24] This time the Müller method results in shape parameters of 2.84 and 2.5. Again the estimate for the reverse distribution is less than that for the obverse (the reverse distribution is more variable). A glance at Figs. 11 and 12 shows that the observed frequency distribution is somewhat erratic so it will be hard to fit: k = 2 comes about as close as possible to fitting the lower obverse multiplicites, k = 1.8 for the reverse.

The last set of ancient coin data is from tetradrachms of the second century B.C. (Fig. 13).[25] Note the short vertical scale which means we can expect high relative variability. All but two of the non-zero frequencies are for multiplicities between 1 and 13, but one die was represented by 19 coins and another by 33. These two have a huge influence on the traditional estimate for k which is 1.32. Putting both at 19 changes that to 2.73. Putting both at 14 changes that further to 4.25. Obviously, the estimate for k depends strongly upon extreme values. Fig. 13 gives the picture for k = 2 with the die represented by 33 coins omitted. The sample appears to be so thorough that very few dies remain unobserved. Any smooth curve fit through these points could hardly produce an estimate of the number of unobserved dies greater than say, 5. The k = 2 curve yields an unobserved die estimate of about 2 or 3.

The last set of data we consider here is from Elizabeth I sixpences.[26] The frequencies are again not large enough to produce a smooth

[24] C. A. Hersh, "A Study of the Coinage of the Moneyer C. Calpurnius Piso L. F. Frugi," *NC* 1976, pp. 7–63.

[25] N. F. Jones, "The Autonomous Wreathed Tetradrachms of Magnesia-on-Maeander," *ANSMN* 24 (1979), pp. 63–109.

[26] D. G. Borden and I. D. Brown, "The Milled Coinage of Elizabeth I," *BNJ* 53 (1983), pp. 108–32. L. Mildenberg, *The Coinage of the Bar Kokhba War* (Aarau, 1984), gives data from the Bar Kochba series, but it exhibits obvious non-randomness. For example, 1 = f_1 = f_4 = f_5 = f_6 = ... = f_{44} = f_{50} = ... = f_{77} = f_{88}. Most of the rest are zeros, only f_{10} = 2. There is no point in analyzing such data.

frequency plot, but $k = 1.5$ traces a nice middle course for both obverse and reverses (Figs. 14 and 15).

CONCLUSION

The negative-binomial family of probability distributions is attractive for modeling the coin output of dies. Nothing in our data seems to conflict with this choice, nevertheless, it does not produce perfect fits either. From the plots it appears that the single best fitting obverse shape parameter is slightly higher than the corresponding reverse shape parameter, suggesting a more uniform output from the obverse dies. The best fitting shape parameter, k, is between 1.5 and 2.0 for the obverses and between 1.3 and 1.5 for the reverses.

Considering everything, $k = 2$ might well be very close to the true original output parameter, since any non-randomness in the samples will cause the estimates of k to be smaller than they should be. Thus estimates of k near 1.5 may well arise from an original coin output distribution with $k = 2$. If a large corpus from several widely scattered sources were analyzed we would expect $k = 2$ or slightly less to give good estimates.

Some ancient coin data exhibit non-random features. One good way to deal with such data is to concentrate on fitting the low multiplicities, say, singletons through quintuplets. Even so, the singletons seem generally to be more numerous than expected. This implies either a very skewed distribution (perhaps because of non-uniformity of the die making process), or non-random selection of coins (by hoarders, collectors, or museums). Our ability to detect non-randomness which might invalidate our estimates depends upon all the frequencies. Therefore, die count researchers should report all the frequencies and not just n and d.

REVIEW ARTICLE

AT LAST, MORGANTINA

(PLATE 17)   CHARLES A. HERSH

THEODORE V. BUTTREY, KENAN T. ERIM, THOMAS D. GROVES, AND R. ROSS HOLLOWAY, *Morgantina Studies* 2: *The Coins*. Princeton: Princeton University Press, 1989. xx, 245 pp., 49 pls.

More than a quarter century has passed since T. V. Buttrey's important first publication of coins of the Roman denarius system found in the Morgantina excavations and time has only magnified the importance of the material uncovered there.[1] This book is far more than a rewrite of previously published information that helped numismatists fix a firm date for the initiation of the denarius and its associated coins. The pieces discovered in the Princeton University excavations at Serra Orlando in eastern Sicily have allowed archaeologists and historians to locate the site of the ancient city of Morgantina and have resulted in a full discussion of other coinages produced at the mint of Morgantina from the fifth to the second centuries B.C.

The first part of the book is divided into three sections. The first includes competent and interesting die studies of the fifth- and fourth-century silver and bronze coinages bearing the name of Morgantina. The early silver is very rare, but the later fourth-century pieces are less so and some of these were found on the site. The bronzes of this later

[1] T. V. Buttrey, "The Morgantina Excavations and the Date of the Roman Denarius," *Congresso Internazionale di Numismatica Roma 1961* II. Atti (Rome, 1965), pp. 261–67.

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period are also less scarce and occurred in relative abundance in the excavations. Bronzes of other cities struck over issues of Morgantina are carefully listed; Morgantina's mint seems not to have overstruck the bronzes of her neighbors, although the practice was common in Sicily in the second half of the fourth century.

The second section contains a listing of the extremely rare ΣΙΚΕΛΙΩΤΑΝ gold and silver issues struck during the Second Punic War. It was originally Sjöqvist's idea that these coins were struck at Morgantina, and from the frequency of their discovery in hoards in this area and the lack of other fixed provenances, this now seems very probable.[2] It is therefore unfortunate that the authors did not choose to provide us with a die study of these issues, building on Burnett's work in his excellent article on the Enna hoard, which was found in this area.[3]

In the third section, there is a series of die studies of the HISPA-NORVM issues of the later second (and perhaps early first) century, probably the last products of the mint of Morgantina. These pieces were struck by Spanish mercenaries who were given control of the twice rebellious city by the Romans after its recapture during the Second Punic War. These coins were common in the excavations, and the archaeological context in which they were found has led to a redating of these issues from their earlier attribution to the time of Sextus Pompey in the 40s and 30s B.C.

The second part of the book consists of a complete listing of all the coins found in the excavations, by city and chronology, from 1955 to 1981, followed by parts three and four, a catalogue of the stratigraphically related finds and coins recovered between 1955 and 1962, and then between 1963 and 1981. These carefully detailed records of the hoards are of great value and are a tribute to the professionalism of the Princeton excavators.

There is no question that the most important impact of these excavations on numismatics is made by the several finds including anonymous Roman gold and silver pieces of the early denarius system. These coins

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[2] E. Sjöqvist, "Numismatic Notes from Morgantina I. The ΣΙΚΕΛΙΩΤΑΝ Coinage," *ANSMN* 9 (1960), pp. 53–63. See Table 2.

[3] A. M. Burnett, "The Enna Hoard and the Silver Coinage of the Syracusan Democracy," *SNR* 62 (1983), pp. 10–11.

were uncovered in sealed and undisturbed archaeological strata associated with the recapture and destruction by fire of the city by the Romans in 211. Among them were a 20-as Mars/eagle gold piece with wheat-ear symbol, indicative of Sicilian mintage, as well as a run of early anonymous silver comprising victoriati, a denarius, quinarii, and sestertii, all generally in excellent condition. The Roman pieces were discovered below burnt debris and in a closed cistern in levels that also contained Sicilian issues such as silver and bronze coins struck by Hieronymus of Syracuse (215–214), bronzes struck by the fifth republic of Syracuse (214–212), and Carthaginian quarter-shekels (Triptolemus/ galloping horse) that were probably struck at Agrigentum but certainly were minted prior to the expulsion of Carthaginian forces from Sicily in 210. This is vital evidence for the dating of the first issues of the denarius system in the years between the conclusion of the relief-legend quadrigati, say in 215–214, and the destruction of Morgantina in 211.

It is here, however, that the book lacks updated or new information. The appendices include reprints of Buttrey's 1965 and 1979 articles on the importance of the Morgantina coins for correctly dating the start of the denarius system, but minimal information only (and no meaningful commentary) is provided on the importance of the Enna hoard and Morgantina B, while no mention at all is made of Morgantina A.[4] Since this significant hoard information was not provided, I shall try to supply some facts on the coins in these three finds, as well as further data on the silver coins of the denarius system from the Morgantina excavations.

When Edward Sydenham produced the first modern arrangement of the issues of the early denarius system, one of his primary tools for organizing the coins (and especially those without any identifying symbols, letters, or monograms) was his classification of the various helmet shapes and visor designs worn by the head of Roma (or Bellona)

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[4] For Buttrey's 1965 article, see n. 1; also his "Morgantina and the Denarius," *NAC* 8 (1979), pp. 149–57. For Enna, see above n. 3. For Morgantina A, see A. S. Walker, "Some Hoards from Sicily and a Carthaginian Issue of the Second Punic War," *Festschrift für Leo Mildenberg* (Wetteren, 1984), pp. 269–88. The unpublished Morgantina B is mentioned by Walker; for a summary of its contents, see below, Table 2.

on these pieces.[5] Helmet types A, B, and C were a simple bowl-shaped helmet, with the visor on A curved and that on B and C splayed in various forms. Type D consisted of a Phrygian helmet and occurred only on a few issues of quinarii and some exceedingly rare sestertii. Type E showed a helmet with a peaked visor; with some variations, this helmet type continued to be used for the next century, as long as the head of Roma was used on the obverse of the denarius.

Sydenham's alphabet corresponded to his chronology, for the most part, with type A being earliest. Crawford's plates showed anonymous issues with type B first[6] followed by type A.[7] Both are dated by the author "from 211" or "after 211." Helmet type C issues are dated "211–208" and correctly segregated as Sicilian mintings;[8] but anonymous denarii with type E are also dated "after 211," which certainly seems to indicate that he thought all these issues were struck concurrently.[9] Crawford does not clearly separate those anonymous issues with various symbols, letters, and monograms by helmet type. Pieces with helmet type A,[10] type B,[11] and type E[12] are intermingled in his arrangement, for the most part without any real differentiation among the dates that these issues were minted. Helmet types A, B, and E generally appear on coins struck in Italy, helmet type C on pieces struck in Sicily, while the uncommon D-type Phrygian helmet is associated with south Italy. The early anonymous Roman silver found at Morgantina in undisturbed strata or in the sealed cistern (pls. 45–46) are listed in Table 1.

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[5] E. A. Sydenham, *The Coinage of the Roman Republic* (London, 1952). For illustrations of the various helmet and visor styles see his pl. 1. Sydenham's chronology of the various issues is too late, as the Morgantina excavations themselves help to demonstrate. M. H. Crawford, *Roman Republican Coinage* (Cambridge, 1974) (hereafter "C.") is presently the standard reference.

[6] C. 44/5–7, pl. 9, 10–21.

[7] C. 44/5–7, pl. 9, 22–24.

[8] C. 68/1b, 2b, and 3, pls. 13, 21–22, and 14, 2–3.

[9] C. 53/2, 54/1, and 55/1, pl. 10, 13–22.

[10] C. 50/2, 52/1, 59/1a–1b, 60/1c, 61/1, and 62/1.

[11] C. 51/1, 60/1a, 63/1, 64/1, 65/1, 83/2–3, 84/1–3, 85/1a–1b, and 86A/1.

[12] C. 57/2, 58/2, 88/2a–b, and 89/2.

TABLE 1

Early Anonymous Silver from Morgantina

Denomi-nation	Catalogue No.	Crawford No.	Crawford Date	Inv. No.	Hoard No.	Helmet Type
Denarius	506	44/5	from 211	58–1682	29	B–2
Quinarius	507–1	68/2b	211–208	58–1679	29	C–3
Quinarius	507–2	not ill.	–	58–1680	29	C–2
Quinarius	507–3	68/2b	211–208	58–1681	29	C–3
Quinarius	507–4	68/2b	211–208	56–3152	25	C–3
Quinarius	507–5	Helmet type not clear, but probably				C–3
Sestertius	508–1	44/7	from 211	56–3134	25	B–4
Sestertius	508–2	44/7	from 211	58–1678	29	B–4
Sestertius	508–3	44/7	from 211	56–3144	25	B–4
Sestertius	508–4	44/7	from 211	56–3120	25	B–3
Sestertius	508–5	44/7	from 211	56–3143	25	B–4
Sestertius	508–6	44/7	from 211	58–1847	30	B
Æ 20–as	522	72/2	211–210	56–1677	25	–

Information on three other finds helps to show how early denarius issues from the Morgantina excavations compare with other finds from this area of Sicily.

TABLE 2

Mixed Hoards of Silver from Sicily

Minter	Enna Coins	Denoms.	Morgantina B Coins	Denoms.	Morgantina A Coins	Denoms.
Akragas						
Zeus/eagle	14	2	64	3	–	–
Syracuse						
Agathokles	1	1	–	–	–	–
Philistis	36	2	49	2	–	–
Gelon II	7	3	6	2	–	–
Hieronymos (215–214)	12	2	11	2	–	–
Fifth Republic (214–212)	38	5	52	6ª	1	1
Sikeliotai	5	2	21	3	–	–

Minter	Enna Coins	Denoms.	Morgantina B Coins	Denoms.	Morgantina A Coins	Denoms.
Carthaginian						
Male head/elephant	18	2	57	4	1	1
Triptolemos/ prancing horse	21	2	69	2	90	3
Miscellaneous older						
Greek issues	6	–	6	–	5	–
Rome						
Quadrigati (incuse)	18	1	88	2[b]	3	1
(relief)	1	1	42	1	2	1
Victoriati	–	–	8	1	2	1
Denarii	–	–	–	–	3	1
Quinarii	–	–	10	1	6	1
Sestertii	–	–	–	–	6	1
Total	177		483		119	

[a] Includes 8 separate issues.
[b] Includes 3 half-quadrigati.

The 10 quinarii from the Morgantina B hoard include 2 coins with B–2 helmet; 4 coins with B–3 helmet; and 4 coins with C–3 helmet. The 15 denarius-system silver coins from the Morgantina A hoard include 3 denarii: 1 coin with B–3 helmet (probably); 1 coin with C–1 helmet; 1 coin with C–2 helmet; 6 quinarii: 1 coin with B–1 helmet; 2 coins with B–3 helmet; 3 coins with C–3 helmet; and 6 sestertii: 1 coin with B–2 helmet; 4 coins with B–3 helmet; and 1 coin with B–4 helmet.

In the Enna hoard there were 19 Roman quadrigati among a total of 177 coins, but no pieces of the denarius system. Of the quadrigati, 18 had an incuse legend on the reverse, including 1 (177) with a mixed legend (mostly incuse, but partly in relief), while 1 (176) had its legend fully in relief.

Morgantina B was buried somewhat later and was made up of 483 coins, including 127 quadrigati and 3 half-quadrigati. Of these quadrigati, 85 had incuse legends, including 3 with a mixed legend, and 42 had relief legends. Among these later quadrigati with relief legend there was a full range of the known obverse styles of the young janiform

head. Twelve of these relief-legend quadrigati bore the wheat-ear symbol indicative of a Sicilian mint provenance; this is a very rare issue, as only 33 coins overall are known to me. There were 10 anonymous quinarii (Plate 17, 1–10) 7 anonymous victoriati (Plate 17, A-H) and 1 C/M victoriatus (C. 71/1a).

Morgantina A was composed of 119 coins, including 22 Roman pieces. There were 5 quadrigati, of which 3 had incuse legends (2 with mixed legends) and 2 had relief legends. There were also 2 anonymous victoriati, 3 anonymous denarii, 6 anonymous quinarii, and 6 anonymous sestertii.

All three of the hoards included coins of the Fifth Syracusan Republic and two Second Punic War Carthaginian issues that were struck in or at least made for circulation only in Sicily. All three also included Roman quadrigati and two had early coins of the Roman denarius system. In general, all three of these hoards included the same types of issues found in the sealed destruction strata in the Morgantina excavations. All four hoards and groups of numismatic material, from the same general area in eastern Sicily, seem to have been deposited within the same short period of time, between about 215 and 208 or so.

Aside from closely pinpointing the approximate date for the initiation of the denarius system, the coins from the excavations at Morgantina and these three other finds from Sicily imply a good deal more about the early silver coins of the denarius system. It would appear reasonable to infer that coins with helmet style B were the first to be struck (primarily in Italy), very closely followed by helmet style C issues in Sicily. Helmet style D coins seem to have been minted, in much smaller quantities, soon after the helmet style B pieces, presumably in south Italy. The B (and D) helmet style coins were succeeded in Italy by issues with the A helmet style and still later by the peaked-visor E helmet style issues that became the norm at the Rome mint for almost one hundred years. This arrangement fits the coins admirably, as the B helmet style appears on denarii, quinarii, and sestertii and the C helmet style on denarii and quinarii. The A helmet style is met with only on denarii and uncommonly on quinarii, while the E helmet style was used almost exclusively on denarii.[13] From the coins themselves it

[13] Only two anonymous quinarii from this era with E helmet style are known to exist. Both were found in 1984 in a hoard of about 500 pieces from Brindisi, which

is clear that the sestertius was the first denomination to be eliminated, followed by the quinarius. Eventually the only silver coin of the denarius system that continued to be struck after the early years of the second century was the denarius itself.

The Morgantina volume is handsomely done and the plates are outstanding. Errors in the text are very rare, but on p. 217, l. 6, read "gold" for "silver."

KEY TO PLATE 17

Quinarii	Helmet type	Weight
1	B–2	2.13 gm.
2	B–2	1.99
3	B–3	2.18
4	B–3	2.15
5	B–3	2.01
6	B–3	2.14
7	C–3	2.21
8	C–3	1.60
9	C–3	2.21*
10	C–3	2.21
Victoriati		
A		3.26
B		3.14
C		3.52
D		3.52
E		3.35
F		3.21
G		3.30
H, C.71/1a		3.28

* Quinarii 9 and 10 are from the same die pair.

included 96 denarii and 404 quinarii. One of the quinarii was illustrated in Sternberg 15, 11 Apr. 1985, 212.

BOOK REVIEWS

ANCIENT

M. H. Crawford, C. R. Ligota, and J. B. Trapp, eds. *Medals and Coins from Budé to Mommsen.* Warburg Institute Surveys and Texts 21. London: the Warburg Institute, University of London, 1990. 137 pp. illus. ISBN 0–85481–081–1, ISSN 0266–1772. £10.

When Antoine Schnapper published his fascinating study of collecting in France in the seventeenth century (*Le Géant, La Licorne, et La Tulipe. Collections françaises au XVII siècle* [Paris, 1988], p. 134), he felt compelled to decry the absence of any up-to-date history of numismatics. The most recent comprehensive work concentrating on ancient coinage is Babelon's masterful 1901 survey in the first part of the *Traité.* Despite its strengths and utility today, Babelon's work was not an intellectual history of the subject, and attempting to set numismatic scholarship and collecting interest into the cultural history of the periods covered was beyond its scope.

For these reasons, the publication of the papers given at the Warburg Institute's colloquium on numismatics from Petrarch to Eckhel, held in January 1988, is especially welcome. While this book is not and does not purport to be a history of the subject, the various essays are a substantial contribution in and of themselves, and point out how much interesting and important work can be done in the field. It is fitting that the Warburg Institute of the University of London is taking a lead in filling this void, continuing the tradition of two scholars who made some of the most stimulating contributions to the subject since Babelon: Arnaldo Momigliano and Roberto Weiss (see, for example, Momigliano's "Ancient History and the Antiquarian," *Journal of the Warburg and Courtauld Institutes* 13 [1950] and Weiss's *The Renaissance Discovery of Classical Antiquity*[2] [Oxford, 1988]). The 1988 Symposium

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has already had a follow-up with a conference on Antonio Augustin and the classical culture of his times in March 1990, in which several papers had interesting numismatic content and one looks forward to its publication.

The first of the articles in the present volume is a survey of "Collectors of Coins and Numismatics in Early Renaissance France" by Richard Cooper, a scholar of French at Brasenose College, Oxford. It covers an area, with the exception of Budé, not dwelt upon by Weiss and ends just before Schnapper commences. This rewarding article makes several points worth highlighting. Cooper demonstrates that there is much numismatic material, including hoard finds, that can be gleaned from non-numismatic sources for this period, especially local and family histories. Numismatic manuscripts not listed in numismatic bibliographies also demand greater study. Cooper discusses two manuscripts by members of the Lyonnaise circle now in Turin, one by du Choul and the other by Simeoni. Neither one (to my knowledge) has hitherto been recorded in the numismatic literature. The du Choul manuscript, representing the only two surviving books of a twelve-volume study on Roman antiquities, is exceedingly interesting. The work of 1536–38 is ahead of its time in that it presents a sophisticated discussion of coin types in the context of social and political history. This is a major discovery.

Cooper's thoughtful discussion of Budé only highlights the need for a more extensive treatment of this well known but today little-read author. (As the number of sixteenth century abridgements discussed by Cooper shows, Budé was never that easy to read.) Cooper concludes that Budé's chief contribution was to economic history, not to the typological study of coins. This seems fair, but one wonders whether Budé by the very weight of his reputation did not do an inadvertent disservice to early numismatics by separating the field into two distinct parts—one concerned with metrology and economics, the other, in the tradition of Andrea Fulvio, concerned with types, beginning with portraiture and moving on to the social and politico-historical concerns that du Choul had already begun to examine. It is no accident that the earliest numismatic bibliography by Labbé, published in 1664, already separates the field into two divisions. One might argue that these two divisions have only begun to come together in this century.

On a minor point, Cooper speculates that it was due to French nationalism that in one edition an abridgement of Budé's *De Asse* was printed with a work on the discovery of the new world. As Budé was responsible for opening the ancient world, so also were the French responsible for opening the new world. Cooper could be right, but there may be a more practical connection. The popularity of Budé and the general interest in ancient metrology might reflect the contemporary concerns with monetary values driven by the effect that the importation of American gold had on rising prices (see J.-B. Giard, "Critique de la science des monnaies antiques," *Journal des Savants* 1980, p. 230). An additional value of Cooper's paper is his extensive bibliography of sixteenth century works published in France, which is far more comprehensive than the outdated Lipsius. Additions to note are the Italian editions of Roville from Lyons (1581) and du Chou (1571). Georg Agricola's *De Mensuris & Ponderibus* was printed in Paris in 1533, the same year Froben published it in Basle. Also, beside the six-page summary of Budé cited by Cooper, there exists a seven-page version appended to the French jurist François Hotman's *De re numaria* published by Duranti in 1585.

"Basilius Amerbach and His Coin Collection," by Susanne Grunauer von Hoerschelmann, brings to light an important and influential numismatist whose scholarship in the form of letters has never been published, but survives in 22 bound volumes of manuscripts in the library of the University in Basel. The letters reveal, among other things, that Amerbach (1533–91) had an important influence on Adolphus Occo, the well-known author of the *Imperatorum romanorum numismata a Pompeio Magno ad Heraclium* (1579). In fact, Occo wanted Amerbach to revise a second edition of his work, a task that Amerbach never lived to undertake. Amerbach's letters also provide important information on coin finds. Grunauer von Hoerschelmann, like Cooper, shows that modern numismatists need to consider literary archaeology, not just field archaeology, in their study of hoards and circulation patterns. The four hundredth anniversary of Amerbach's death was recently commemorated by an exhibition in his native Basel (Sammeln in der Renaissance: Das Amerbachkabinette, 21 April-21 July 1991) in which much of his collection, ranging from Holbeins to

coins, was reassembled. Publications accompanied the exhibition (see *Journal of the History of Collections* 3.1 [1991], pp. 118-19).

It is not surprising that the next two papers, by British Museum keepers Mark Jones and Andrew Burnett, are concerned in part with questions of authenticity. Both authors contributed to the highly successful exhibition *Fake?* at the British Museum, and these Warburg essays should be read in conjunction with the show's catalogue *Fake? The Art of Deception*, ed. Mark Jones (London, 1990).

Jones's essay, "Proof Stones of History: The Status of Medals as Historical Evidence in Seventeenth Century France," is principally concerned with the creation in the seventeenth century of a medallic history for France in the absence of surviving examples. Was the act of creating such a record merely a work of dishonesty, or the making of an authentic history? Could the recreation be more or less authentic depending on whether the medals were more or less anachronistic? The issues Jones raises are important not just to the history of modern medals, but to the role numismatics played in the contemporary debates on the primacy of different types of historical evidence.

Burnett joins the earlier two authors in bringing to light an unpublished manuscript. In this case it is one in the British Museum —Marco Baldanza's *Instruttione sopra le medaglie degli imperatori antichi romani*. Baldanza, a Tuscan living in Rome, seems to be known only from this manuscript. His work, a product of a sound numismatist with a primarily antiquarian bent, is, as Burnett shows, interesting in two regards: first for the view it provides of the numismatic world in Rome in the early seventeenth century, and second for its discussion of forgeries. While Rome in this period lacked the towering numismatists of the preceding century such as Orsini and Augustin, it was never-theless an active environment replete with scholars, dealers, and collectors.

G. Van der Meer's essay on the great Dutch numismatist "Gerard van Loon (1683–1758): Medallic Theory and Practice" is of value in its discussion not only of his well known and still consulted *Nederlandsche historipenningen*, but of his other numismatic work, the *Inleiding tot de heedendaagsche penningkunde* (1717). This latter book is of interest to all numismatists, not just specialists in the coinage of the Netherlands, and deserves to be better known. It contains van Loon's extensive

discussion of the principles of medallic design. The second edition appeared in 1732, not 1734.

Philip Kinn's "Two Eighteenth Century Studies of Greek Coin Hoards: Bayer and Pellerin" gives due credit, at last, to the scholar who first published a Greek coin hoard: Gottlieb Siegfried Bayer (1694–1738). His article, "Numi decem Erythraeorum in Ionia illustrati" initially published in volume 2 of *Commentarii Academiae scientiarum imperialis petropolitanae* in 1728, contains a masterful discussion of a group of Erythraean coins clearly consisting of a hoard bought in Constantinople. Bayer's approach to the coins is surprisingly akin to that of a modern numismatist. The author attributes Bayer's lack of recognition by contemporary and indeed modern numismatists (the hoard is not in *IGCH*) in part to the obscurity of its publication—a journal from St. Petersburg. But here Kinns is letting the numismatic community off too lightly. Bayer's study was republished, along with his other numismatic work from the *Commentarii*, in 1770, in the presumably more accessible Halle. The collection, *Opuscula ad historiam antiquam, chronologiam, geographiam et rem nummariam spectantia*, was edited by the German numismatist C. A. Klotz and contains biographical information on Bayer. Kinns's other explanation for Bayer's obscurity may be more compelling: "In the eighteenth century his clear-headedness may have been too much for the labyrinthine minds of some of his contemporaries." Eckhel, however, might not have agreed: "...easque opulentiore scriptas eruditione quam suapte argumentum desiderare videbatur" (*DNV*1, p. 161).

The other hoard discussed by Kinns is better known: Pellerin's publication of the Latakia hoard in 1765 was generally regarded as the earliest such work prior to Bayer's rehabilitation. While Kinns deprives Pellerin of this honor he does demonstrate that his publication was a "remarkable pioneering achievement." The sad fact is that the quality of discussion and interest in hoards demonstrated by the two scholars was not duplicated until well into the nineteenth century. A minor addendum to Kinns's useful list of pre-1800 coin hoards is the earliest recorded find from a Greek island (Macedonian coins found in Chios in 1471–72) published by Schwabacher, *SM* 9, p. 19, but not included in *IGCH*.

Daniele Foraboschi in an essay on "Monetary Theory and the Antiquarian: Eighteenth Century Numismatic Research from F. Galiani to S. A. Morcelli" sheds light on Italian numismatic scholarship. Ferdinando Galiani represents the end of a tradition in which a numismatic knowledge based on a classical foundation was essential to discussions of monetary theory. His view of precious metals as commodities was influential on future economic thought. Monetary weight and monetary value had to be distinguished. Upon his death, Italian numismatic scholarship until modern times became dominated by historical and aesthetic concerns, and metrology became secondary. Stefano Morcelli (1737–1821) belongs to a more isolated antiquarian tradition, but nevertheless emerges as an important numismatist who was influential on such scholars as Cavedoni. While numismatics represents only a small portion of his antiquarian writings, epigraphy being a major interest, Morcelli, who was not mentioned in Babelon's survey, has a place in the history of numismatics.

Foraboschi, in reviewing the bibliographic writings of Morcelli, remarks favorably upon another late eighteenth century Italian scholar not mentioned by Babelon, Francesco Antonio Zaccaria (1714–1795), who authored a numismatic handbook of high quality, *Istituzione antiquario-numismatica, o sia introduzione alo studio delle antiche medaglie* (Rome, 1772). This book was also briefly highlighted by F. Basoli in *Monete e Medaglie nel Libro Antico dal XV à XIX Secolo* (Florence, 1985). Zaccaria and his work seem worthy of a fuller treatment.

The final article by Michael Crawford, "From Borghesi to Mommsen: The Creation of an Exact Science" not only complements well the previous two contributions, but provides a fitting conclusion for the volume. While Bayer and Pellerin showed a precocious interest in hoards, their true utility for establishing relative chronology was demonstrated not with Greek coinage but with that of Republican Rome. Indeed it was the Italian scholar Borghesi (1781–1860) to whom credit should be given. He understood, for instance, how to derive chronological information from the relative wear of coins found in hoards. Borghesi, however, never systematized his vast knowledge of Republican coins in a generalized history.

That work remained the task of the great Roman historian Theodor Mommsen, a close correspondent of Borghesi who was nearly 40 years his senior. Mommsen's *Geschichte des römischen Münzwesens* (1860) was epoch-making in its use of hoard evidence to provide chronological order and to estimate the size of respective issues. As Crawford demonstrates, Borghesi and Mommsen were only incidentally numismatists. It was Borghesi's insight into the use of hoards and Mommsen's "sense of what mattered" that led them to elevate Republican coinage from an antiquarian pursuit to part of the historical discourse.

As pointed out in the introduction to this volume, the broad concerns with structure on the part of Borghesi and Mommsen, as evidenced by their interest in gathering together the epigraphic record of Rome, were strikingly similar to those of the great sixteenth century scholars Augustin, Orsini, and du Choul, who tried to "insert the evidence of coinage into a systematic historical discourse and to understand its structure." Crawford concludes this stimulating volume with a challenge to modern numismatists not to lose this sense of historical purpose and hide behind the safety of a specialism.

JONATHAN H. KAGAN
New York

CATHARINE C. LORBER. *Amphipolis. The Civic Coinage in Silver and Gold*. Based on a catalogue compiled by Willy Schwabacher with a contribution on metrology by Wayne E. McGovern. Los Angeles: Numismatic Fine Arts International, Inc., 1990. 196 pp., 31 pls., 1 map, 14 tables, 3 appendices. ISBN 0–9626987–0–9. $40.00.

Catherine Lorber has devoted a magnificent, sumptuously illustrated book to the coinage of Amphipolis. The volume begins with a preface by the late Willy Schwabacher, who had benefited from the material collected by J. M. F. May. Schwabacher's manuscript came to Lorber through Ulla Westermark, who herself had continued his studies on Amphipolis before turning the whole file over to the author.

The first chapter of this richly documented book is devoted to historical background—the foundation of the town by the Athenian Hagnon, a friend of Pericles, on the site of Ennea Hodoi in 437 and the conflicts

which arose due to the varying influences of Athens, Sparta, Macedonia, and the Chalcidians until 357, the date at which Philip II of Macedon conquered it. The author, with considerable erudition, enumerates the studies and excavations of the site, their results, the inscriptions and the epigraphic material which clarifies the history of the city. The religious cults are examined, as well as the remains which testify to the high level of art at Amphipolis.

The second chapter begins with the history of the investigation of the coinage of Amphipolis begun by Schwabacher and updated by Lorber. Then comes an examination of all aspects of the coinage, one of antiquity's most beautiful. What we know today of the coinage consists of 110 tetradrachms struck on the Chalcidian standard from 29 obverse dies and 42 reverse dies in 49 combinations. The tetradrachms are accompanied by drachms, hemidrachms, tetrobols, and obols as well as a unique stater and a unique hemistater in gold.

The obverse of the tetradrachms bears a superb laureate head of Apollo facing, turned slightly to the right or the left, with or without symbol. On the reverse a lighted torch is surrounded by a large frame forming a square and bearing the legend AMΦΙΠΟΛΙΤΕΩΝ or AMΦΙΠΟ-ΛΙΤΩΝ, broken in different ways and sometimes accompanied by one or two symbols. One reverse is different: the torch is surrounded by the legend AMΦΙ and a laurel crown.

Lorber divides the tetradrachms into nine groups, which she generally designates by the name of a symbol which accompanies them, and into subgroups A to Q on different criteria. Her first criterion is the form of the legend: from series A to the middle of series N, the reverses bear the termination TEΩN, with the exception of the gold stater which she nevertheless classes with series M. The hemistater closes the first part of series N—after it all the legends terminate TΩN. Otherwise her classification is based on study of the style of the head of Apollo, an arguably subjective criterion.

Her first group consist of series A-C: on the obverse, the head of Apollo laureate is first right, then left, at first without symbol and then with crab; the reverse is without symbol, the letters of the legend divided 3–3–3–3. This group comprises 6 obverse and 8 reverse dies in 11 combinations, and 25 specimens are known. The second group, series D, is a unique piece with the head of Apollo again turned right, without

symbol, and the reverse is that with laurel crown. The third group is series E: on the obverse there is a head right without symbol, on the reverse a cicada; 1 obverse die, 2 reverse dies, and 2 die combinations were used for the 8 known coins.

The following group is divided into three series with a lion on the obverse. Series F at first has nothing on the reverse, then A to the right of the torch; series G, with A to the right, then to the left of the torch; and series H, with A to the left, then to the right of the torch. There are 27 coins known, with 6 obverse dies, 8 reverse dies, and 10 die combinations. This is the only group which bears a symbol on both obverse and reverse; and only this group and series B and C bear a symbol on the obverse.

The next group is divided into 5 series, I-M, which correspond to 5 obverse dies. All the reverses have a tripod, to the right on series I and the beginning of series J, to the left for the rest. The 5 obverse dies are shared with 8 reverse dies in 10 combinations represented by 20 coins. Because of the tripod symbol, the gold stater with the profile head of Apollo right is also placed here, although the reverse legend ends TΩN and is divided in the unusual fashion otherwise observed only on the 2 last reverses of group P. Another particularity in series M which might serve as an element of classification is the legend of reverse 27, which does not begin at the upper left but at the upper right, which we find on reverses 35 and 37 of series O. Still another is the direction of the flame of the torch: it always goes to the left except on reverses 24 (series J and K) and 25 (series K) of this group as well as on reverses 34 of series N and 42 of series Q.

The following group is very complex. It comprises only a single series—N—but it is divided into 2 parts, and it is here that the termination of the legend changes. The 4 obverse dies are accompanied by 7 reverses which bear 6 different symbols: crown to left, P to right, P to left; then, with the new termination, grape cluster on left, sphinx on right, and sphinx on left with flame to right. The author inserts into this series the unique gold hemistater. This shows on the obverse a profile laureate head left; on the reverse the legend is divided 3–4–3–2, with the old termination, and its symbol is a grape cluster to the right. In series N there are 7 die combinations and 13 tetradrachms.

The next group also comprises only a single series—O—with 4 obverse dies and 4 reverse dies all bearing the same symbol, grain ear to the right. But on 2 of the reverses the legend begins at the upper right. In this group there are 4 die combinations and 9 coins. At the bottom of table 2, p. 26, illustrating the tetradrachm die links, the end of the second column of obverses is faulty and should be corrected thus:

O   O24 ——————— (44) ——————— R35

           O25 ——————— (45) ——————— R36

           O26 ——————— (46) ——————— R37

           O27 ——————— (47) ——————— R38

P   O28 ——————— (48) ——————— R39

                         (49)

                         (50)   R40

                                             R41

Q   O29 ——————— (51) ——————— R42

The following group (Boeotian shield) consists of series P, with a single obverse die, 3 reverses of which 2 have a Boeotian shield to left and 1 with a grape cluster to left and club to right. The 2 last reverses present a new form of legend: in place of the division AMΦ ITO ΛIT ΩN universally employed up to now, it is divided AM ΦIΠ OΛI TΩN, as on the reverse of the gold stater. There are 3 combinations for the 4 coins.

In the last group, series Q, a laureate profile head left is on the obverse. The author later tells us that the head of Apollo is sometimes, as in the case here, replaced by the head of Artemis. On the reverse the flame blows to the right, the division of the legend is the usual one, the

symbol is again **A** on the left. There are three specimens struck from the same pair of dies.

After studying the four smaller denominations the author organizes the reverse dies of the tetradrachms by probable engravers and examines the metrology of all the series.

The third chapter is devoted to the analysis of eight hoards containing coins of Amphipolis. The author goes into detail concerning the date of burial of the Aidhonokhorion hoard—which she places between 367 and 360 rather than 400–375—and refines the dates of others. She concurs with the ca. 357 date for the Avola hoard, where the presence of the unique stater of Amphipolis is not certain and for which the burial date has been reconsidered since the 100–litra pieces of Syracuse have been redated to the end of the fifth century. She connects the burial of hoards with political disturbances or the dangers of war although other occurrences might have prevented owners from recovering their concealed property.

In the fourth chapter the author attempts to present the absolute chronology of these issues. Taking account of political events, she determines the date of series N, and sets the rest of the coinage in order of annual emissions by series, going back to 371, the date of the conference of Sparta, and forward to 354, according to her the final closing of the mint—either as a result of the difficulty of acquiring precious metal or because of the intervention of Philip II. She concludes that the fall of Amphipolis in 357 did not necessarily prevent the mint from functioning and that the royal mint of Amphipolis only opened some years later. Even if one accepts her arrangement of the coinage it seems dangerous to hypothesize annual issues without more substantive proof.

The author places the first emission of drachms in 370/69, concurrent with the series B tetradrachms. The types of the drachms are the same as those of the tetradrachms, and the reason for the classification is stylistic. The second series of drachms is dated 369/8 for the same reasons. It is followed by a heavier series: from a modal weight of 3.56–3.60 g, it rises to almost 4.00 g. But the first drachm reverse, linked to the first obverse of the light drachms, is also linked to the last obverse of the heavy drachms, and it would be possible to invert their order. There are nine obverse dies and six reverse dies in 13

combinations for all the drachms. A single pair of hemidrachms of identical types accompanies the light weight drachms.

The tetrobols are dated 367/6 and attached to series D, with laurel crown on reverse, for they bear the same type; but on the obverse the head of Apollo is turned to the left. All the coins are struck from a single pair of dies and their mean weight is 2.30 g.

The obols have an obverse profile head laureate right and a reverse dolphin downward to the right with the legend AMΦI in the four corners. They are divided into three groups and struck from nine obverse and nine reverse dies. They are not dated. Their modal weight is 0.41–0.45 g, slightly lighter than a quarter of a tetrobol.

The weight of the two gold issues, each known from a single specimen, corresponds to the Attic standard. It might be possible to move the stater down to series P, to which the reverse legend corresponds: in any case the two emissions must be linked and should be placed around the end of the coinage.

In my view the author has attempted to elicit everything possible from the available material. With 110 known pieces struck from 29 obverse and 42 reverse dies—and only 19 die links—we are no doubt still far from knowing the whole of the coinage. If other finds come to light, it will be easier to understand the organization of the mint, which may have struck in a manner less systematic and in a shorter time than the author presently thinks. It may be equally possible to determine with greater precision the development of the weights of the tetradrachms.

The following chapters are devoted to study of the royal mints of Philip II, the coinage of Abdera, Maronea, Olynthus, and other Macedonian mints, the coin types and their symbolism, and artistic considerations. In appendix 3 two mid-century hoards are published, those of Abdera 1986 and Aenus 1987.

The author also tries to pursue one of the ideas dear to Willy Schwabacher, who supposed that certain dies were made with the aid of punches before being engraved. But this would only be justified in the case of mass production where artistic quality had no importance. The punch would have had no use at Amphipolis, as engravers capable of these chefs d'œuvre would have had no need of them.

After the catalogue of the whole coinage, there is a list with illustrations of all known forgeries, which has been badly lacking up to now. The plates are magnificent and show not only the coinage of Amphipolis, but also models from glyptic and plastic art which might have inspired the engravers and the works inspired in their turn by the coins of Amphipolis. Ms. Lorber is to be thanked for a richly documented volume that will fill a significant gap.

DENYSE BÉREND
Boulogne

ALAIN DAVESNE AND GEORGES LE RIDER with contributions by FRANÇOISE DE CÉNIVAL, CATHERINE JOANNÈS, ANDRÉ LEMAIRE, AND OLIVIER MASSON. *Gülnar II. Le Trésor de Meydancıkkale (Cilicie Trachée, 1980)*. Institut Français d'Études Anatoliennes. Éditions Recherche sur les Civilisations. Paris, 1989, 2 vols. 377 pp., 157 pls.

Complete hoards found in legal archaeological excavations are so rare that the importance of what was known until this volume appeared as the "Gülnar hoard" cannot be overstated nor the authors and the French mission complimented enough for its speedy publication. The desire to make the material available to scholars as soon as possible explains why *Gülnar* 2 precedes *Gülnar* 1, which will present the site in general.

The circumstances of discovery approach what most excavators are only able to dream about in their lifetime and the introduction reads like a novel. The French, under the direction of Emmanuel Laroche, had been excavating the site of "Meydancıkkale" the "fortress of the small square," in Cilicia Tracheia or Isauria, since 1971. After 10 years of work, the hoard was found in 1981 in a hellenistic building resting on an earlier, possibly Persian structure, which must have had some public function. The treasure had been deposited in three different vases, designated by letters in order of their discovery: A) contained 2,298 coins, B) 1,786, and C) slightly smaller, 1,131 coins. All 5,215 coins are silver and of mixed denominations. They are now in the museum of Silifke in Turkey.

When Georges Le Rider became director of the French Archaeological Institute in Istanbul, he assumed responsibility for the publication of the coins with Alain Davesne, the present director of the excavations. Volume 1 of the set, the text, contains a brief introduction, followed by an excellent catalogue of the coins. The catalogue format is succinct, in small print, and as abbreviated as possible, because of the large number of coins; but the dies, the symbols and monograms as well as every detail are carefully described, and references to the relevant mint studies given. The commentary is presented in a second section—a much more logical and satisfactory arrangement than the more usual reverse order. Part 3 consists of an onomastic study of the graffiti on the Ptolemaic coins by linguists (O. Masson : Greek and Cypriot; F. de Cénival: demotic; A. Lemaire: Semitic). The indices unfortunately have been limited to the minimum: an index of hoards and an index to the commentary. An index of the symbols and monograms and an exhaustive index of mints would have been useful.

Volume 2 contains the illustrations, which are as complete as financial restrictions allowed: coins of the same obverse are not all reproduced but only the better preserved. The quality of the photographs could have been better.

The hoard included: 1) 2,554 Alexander drachms and tetradrachms in the name of Alexander III or Philip III; 2) 31 drachms and tetradrachms of Demetrius Poliorcetes; 3) 3 tetradrachms of Antigonos Gonatas; 4) 148 Lysimachi, mostly posthumous, drachms and tetradrachms; 5) 261 Seleucid coins, drachms and tetradrachms; 6) 60 tetradrachms of the Attalids of Pergamum; and 7) 2,158 Ptolemaic coins (tetradrachms, octodrachms, and decadrachms). In all there are 1,714 tetradrachms and 1,343 drachms of Attic weight and 13 decadrachms, 4 octodrachms and 2,141 tetradrachms of Ptolemaic weight. The mixture of two currencies on different standards is very unusual since they mutually excluded each other in circulation.

The contents of pots A and B were similar, Pot C, however, contained no posthumous Lysimachi, no Seleucid coins after Antiochus I, no Attalid coins, and only one Ptolemaic coin. The circumstances of discovery, however, clearly show that they were all interred together in one deposit, and the authors convincingly reject the possibility of two separate hoards.

Not all the groups of coins in the hoard are equally or easily datable. At first a burial date seems difficult to establish and the results of the analysis of the coins point to different and conflicting conclusions. The most recent issues represented, the 50 or so posthumous Lysimachi, are of no use for chronology: Le Rider recalls Seyrig's saying that "Lysimachi do not date hoards but hoards date Lysimachi." The coins of Demetrius Poliorcetes and Antigonus Gonatas are only approximately dated between 270 and 239 B.C. But for the other four main groups, the Alexanders, the coins of the Ptolemies, the Seleucids, and the Attalids, more precise dates have been suggested and I summarize the detailed discussion.

There were 2,738 coins of Alexander type, including those in the name of Seleucus, Antiochus, or Lysimachus. Among these Alexanders, the 22 tetradrachms of Aradus (2043–64) with the name of Alexander, the palm tree and the monogram *Я* are chronologically the most interesting since 4 of them at least are dated to year 17 and 18 of the era of Aradus, i.e. 243/2–242/1 B.C. Their condition is very good and an examination of the weights and the weight loss confirms that they have not circulated long. So this group of coins would indicate an interment of the hoard soon after 242/41 B.C.

The 2,158 coins of the Ptolemies are almost as numerous as the Alexanders. Of these, 261 from Syria and Phoenicia are dated. Of particular importance are the ten coins struck under Ptolemy III and dated between 246 and 243/2 B.C. of which the latest are two tetradrachms of year 5 from Joppa, 243/2 B.C. This series of dated coins stops with year 6 (Svoronos 1032–33 and 1044) which is not represented in the hoard though every other year since 265/4 (except for 260/59 when probably no coins were struck in the Phoenician mints) is represented in the hoard. The coins of Arsinoe II present similar evidence: H. A. Troxell (*ANSMN* 28 [1983], pp. 35-70) has convincingly and securely redated the Arsinoe coinage and shown that it terminated in 242/1 B.C. (not, as previously thought, with the death of Ptolemy Euergetes in 221/20 B.C.). Nonetheless A. Davesne supplements these indications with a chronology based on the weights and the weight loss of all the Ptolemaic issues which fully corroborates the results from the dated issues and suggests a burial date between 240 and 235 B.C.

If one follows the traditional chronology, the Seleucid and Attalid coins points to a lower date of about 225–220 B.C. Le Rider, however, argues that the chronology is not firmly established, and suggests a revision of certain dates and attributions.

Among the 261 Seleucid coins, all the most recent issues belong not just to Seleucus II but to the beginning of his reign. The tetradrachm 2763 is reattributed to Antiochus II, as Newell thought (*WSM* 1136), and not to Hierax as C. Boehringer argued (*Chronologie*, pp. 162–71), and catalogued as "Apamea," though the series probably belongs to Antioch. The tetradrachms of Lysimachia 2867–68 tentatively attributed to Antiochus III (196–190 B.C.) by Newell and to Hierax by Boehringer are assigned to Antiochus II (261–246 B.C.) since an example of this issue is present in the Tell Kalaf hoard (*IGCH* 1763, cf. now *RN* 1989, pp. 25–40) buried before the reign of Antiochus Hierax. These rearrangements leave no coins of Hierax in the Meydancıkkale hoard which is not surprising since they did not really circulate in Cilicia. The Alexander type tetradrachms of Laodicea ad Mare with the name of Seleucus 2769–85 (*WSM* 1202–25), dated by Newell between 300 and 223 B.C., cannot have spanned so many years considering their uniformity of style. The latest one (*WSM* 1225) present in the hoard found in the base of the statue of Artemis at Sardes (*IGCH* 1299) belongs to the beginning of the reign of Seleucus according to Le Rider. Likewise the issues of Antioch (including *WSM* 1146 and 1148, "Apamea") are placed between 245 and 240/39 B.C. in the context of the Laodicean war and the defeat of Seleucus II at Ancyra. The most striking of the latest Seleucid issues in the hoard are perhaps the 34 tetradrachms 2792–2825: Newell knew only 2 specimens and attributed them to an uncertain Cilician mint (*WSM* 1641–42). The hoard coins are all from the same obverse die and share four different reverses. They obviously represent the latest group in the hoard, probably struck not far from the burial place (Seleucia ad Calycadnum is possible but not certain) and this hoard determines their date.

There are 60 coins of the kings of Pergamum in the name of Philetaerus in the hoard (plus two Alexanders in the name of Seleucus struck in Pergamum by Philetaerus). The first group (2998–99) bears a beautiful portrait of Seleucus I. The invaluable corpus of U. Westermark, *Das Bildnis des Philetairos von Pergamon* (1961), starts

with group II and classifies all the tetradrachms with the portrait of Philetaerus in eight groups. The 14 latest ones in the Meydancıkkale hoard (3044–57) belong to groups IV, V, and VI A, which Westermark placed under Attalus I (241–197 B.C.). Although Westermark does not attempt a precise chronology, 220 B.C. would seem a terminus ante quem for the coins in the hoard. C. Boehringer (*Chronologie*, pp. 42-43) proposed a similar chronology and dated group VI A between 228 and 220 B.C. A reexamination of the hoard evidence, in particular of *IGCH* 1299, 1369, and 1763, leads Le Rider to date groups IV A, IV B and V under Eumenes I, as Margaret Thompson had already suggested in her study of the Büyükçekmece hoard (*IGCH* 867), and VI A to the beginning of the reign of Attalus. The 14 tetradrachms of this group in the hoard share obverse dies and are extremely well preserved. So Boehringer's (and Westermark's) chronology for groups IV A through VI A must be updated from 240–220/15 to about 255/50–235 B.C. This would mean that the Pergamene mint was active in the period of preparation for the war against the Galatians.

The most important consequence of the revised chronology is that it puts the mints of Pergamum and Antioch in a different perspective, revealing that their coinages were never regular but intermittent and basically marginal: the major currency consisted of the Alexanders.

It is impossible to review every mint or every issue represented in the hoard; some remarks on the Alexanders and the Ptolemies will suffice.

Thanks to the work of E. T. Newell and M. Thompson the Alexanders presented very few problems of attribution. Only fifteen tetradrachms (2486–2500) and thirty drachms (2501–26, 2529–32) remain uncertain. Of particular interest are the tetradrachms 2487, 2488, 2490, 2496, 2497, and 2500 with previously unknown symbols or monograms. The issues 2147–86 have been called "Ake-Tyre" to recall the interesting attribution to Tyre by A. Lemaire which M. J. Price rejected.

Likewise problems of chronology are not crucial. For the beginning of Alexander's silver coinage in Macedonia, Troxell (in *Mnemata: Papers in Memory of Nancy M. Waggoner* [New York, 1991], pp. 49-62) has now shown that the date of 332 B.C., after Alexander had already started his campaign in Asia, is much more probable. The lowering of the beginning of Alexander's coinage, as well as her rearrangement of the issues between 332 and 317 B.C. (Akçakale hoard) with the heaviest

minting of groups E, F, and G between 325 and 323 B.C. immediately after Alexander's death, has consequences for the calculations of the average weight and weight loss due to wear on pp. 244–45.

For the civic Alexanders, the hoard confirms that Regling's dating for Priene (1460–61) after 230 B.C. is too late. For Mylasa (1603–14, 2527–28) the hoard allows a more precise date between 280 and 270 B.C.

The Ptolemaic coins in the hoard (2,158) are almost as important as the Alexanders. They belong to the reigns of the first three Ptolemies for which the corpus of Svoronos remains the standard reference. The large number of coins in the hoard leads A. Davesne to attempt a reclassification of the Ptolemaic issues by studying first the dated Syro-Phoenician coins and then comparing them with the undated series. He arrives at a later date for the first three undated issues of Tyre, between 274/71 and 267/6 B.C. It is somewhat disturbing that references are more often to Svoronos than to the catalogue numbers of the Meydancıkkale hoard. The new proposed arrangement and tentative chronology are based largely on statistics, mainly on calculations of the attrition or loss of weight ("frai" in French) of the dated series of Tyre, Sidon, Ptolemais, and Gaza (pp. 264–65). The low number of samples for each year forces the author to use the average weight of the coins, instead of the mode more commonly used in frequency tables. The weights of the undated issues are then compared to these first tables and the result is a new classification according to a theoretical weight (pp. 295–96). Though the author goes out of his way to explain how tentative and hypothetical the established chronology is (pp. 294 and 297) the simple fact that such neat arrangement of the issues is presented in tabular form is dangerous. It will probably be used as proven truth by those who want to catalogue Ptolemaic coins. Until more material and more hoards of the same kind (wishful thinking!) can be studied, the conclusions from the attrition of the coins remain hypothetical.

It is interesting that the Alexanders (pp. 243–56) reveal a lesser average attrition per year of 0.5 cg. (0.7 cg. on Troxell's chronology) for the tetradrachms (0.3 cg. for the drachms) whereas the Ptolemaic coins lost on average 1 cg. per year. This discrepancy is explained (pp. 341–42) by the different pattern of circulation of the two: the Alexanders were a plentiful currency in a "free market" economy but

the Ptolemaic coins were tightly controlled and recirculated until worn. The volume of the Ptolemaic issues or the output of the different mints is calculated on the number of coins present in the hoard. Since the die study was available, a calculation based on the number of dies would have been more reliable or it would have been interesting to compare the results of both methods. Even in a hoard of the size of the Meydan-cıkkale hoard, the presence of certain groups of coins can be totally fortuitous.

A very interesting feature of the Ptolemaic coins is the great quantity of private countermarks ("estampilles" in French, easily distinguished from the official city or state countermarks by their size and most of all by the number in which they occur—sometimes more than ten on a single coin) and graffiti they present. Both have been studied and described in detail.

Unfortunately no satisfactory explanation for them can be offered: both were applied to the same coins and differ only in technique. All that can be said is that they represented markings by private individuals who perhaps intended to recover their pieces after spending them, as suggested by Davesne. They could not have served to demonetize the coins since they continued to be used. Could they have been markings of temporary revalidation of an obsolete currency?

Davesne observed that almost all of the coins dated to about 274/3–272/1 B.C. or earlier were counterstamped or inscribed—and even hammered. This practice decreased steadily and finally disappeared by 243/2 B.C. This chronological interpretation, however, may be biased: though other hoards contained counterstamped coins or coins bearing graffiti (e.g. Demanhur, *IGCH* 1664), none contains such a large number of "altered" coins and a more prudent conclusion seems to be that the older the coins, the more markings they bore.

The Meydancıkkale hoard presents an invaluable amount of information on all the different issues represented. Most of all it sheds new light on the coinages of the third century B.C., in particular on the posthumous and civic Alexanders: they were the real currency of the Seleucid empire, supporting the economy. The regal coinages of the Seleucids and the Attalids were not very important and only sporadic, intended for special occasions. This book revises the erroneous—and, no doubt, unintentional—impression created by Newell's monumental

work on the Seleucids (*ESM* and *WSM*) whose numismatic and historical importance was never paralleled by the size of their coinages. The hoard also provides material for a new approach to the coins of the Ptolemies and a better dating of the posthumous Lysimachi of Byzantium and Calchedon. This is a very readable book and an indispensable tool for anybody interested in the early hellenistic period.

CARMEN ARNOLD-BIUCCHI
The American Numismatic Society

KATHERINE GRUEL. *La monnaie chez les gaulois*. Paris: Éditions Errance, Collection des Hespérides, 1989. 79 pp., illus. ISBN 2-903442-83-5. No price stated.

In the past few decades interest in the world of the Celts has grown, and these people, once poorly known, are emerging in a new light. Their coinage, once not even the object of study, is also attracting new interest. It therefore causes no surprise that there are now numerous publications. Many of these are devoted to narrower problems, but there are also general discussions of the coinage and even "picture books" that introduce the non-specialist to the strange beauty of this series. Gruel's contribution belongs to all three categories. Her theme is the coinage of the Celtic tribes of Gaul, the region we know today as France and Belgium.

The introduction traces the development of the investigation of Celtic coinage and presents a discussion of the use of coins in the Celtic world. The author offers a geographical and chronological framework which is extremely useful for those who wish to see the coinage of Gaul within its different regions. Her arrangement follows that of the doyen of Celtic numismatics in France, J.-B. Colbert de Beaulieu.

The iconographic interpretation of Celtic coins has always been intriguing, but it is also dangerous and can lead to speculation and fantasy. Gruel is well aware of the dangers, and presents a fair analysis of the world of Celtic coins and their parallels in other areas of Celtic art. Also useful, especially for the beginner, is the chapter about the function of the coinage, which served on the one hand as an expression of prestige and importance and on the other as an instrument of commerce and daily life. This is best shown by the material itself: after Caesar's

occupation of Gaul, only cast bronze (the so-called "potin") coins were produced, which were the stuff of day-to-day commercial transactions.

The appended materials offer some reflections about the technique and production of Celtic coins in Gaul, a strange chapter about ceremonial exchange in Melanesia, a useful glossary, and a bibliography. The bibliography is rather haphazard: for example, two works by Simone Scheers are listed, the first her important *Traité de numismatique celtique*, the second not unimportant but scarcely different from dozens of her other publications that go unmentioned.

In fact the lack of selective bibliography and citations is a major problem. In the book itself there are no footnotes, and it is often impossible to determine whence the author derives her information and opinions or to differentiate them from her often interesting new theories. The illustrations are also troublesome. The printer may be blamed for the poor quality, but in addition most of the coins are shown enlarged, without scale, so that no one other than a specialist can sense the real size of the coins.

The book is adequate as an introduction to the Celtic coinage of Gaul, but the collector or serious student will still want to turn to more scientific and detailed publications.

<div align="right">

GÜNTHER DEMBSKI

Bundessammlung von Medaillen, Münzen und Geldzeichen
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OSMUND BOPEARACHCHI. *Monnaies gréco-bactriennes et indo-grecques: catalogue raisonné.* Paris: Bibliothèque Nationale, 1991. 459 pp., 69 pls. ISBN 2–7177–1825–7. FF 400

Dr. Bopearachchi ranks among the leading students of Bactrian and Indo-Greek coinages, and this impressive publication of the large collection of the Bibliothèque Nationale is certainly his most important work to date. Well trained by such scholars as Paul Bernard and Georges Le Rider (who provides a preface to this work), Bopearachchi displays considerable erudition in his handling of the complex problems, both numismatic and historical, associated with these coins. He begins by setting forth his methods (pp. 13–34), comparing his own cataloguing systems to those of his main predecessors, Lahiri (1965) and Mitchiner

(1975), and notes the place of his historical reconstruction, particularly its chronology, in relation to the older histories of Tarn and others. Never carping, Bopearachchi pays due homage to the pioneers in this field while justifying the place of his own work in the literature. The extensive bibliography (over 280 items) and long list of public and private collections personally examined by the author are impressive, and this wide-ranging research accentuates the fact that this is no sylloge, but rather a full treatment of even those coin types and monogram varieties not represented among the 1,127 specimens in the BN collection.

After a brief chapter (pp. 35–39) on the history of the BN collection itself, Bopearachchi plunges into a detailed chapter (pp. 41–141) that covers the coinages and reigns of the Bactrian and Indo-Greek kings from the Diodotids to the last Stratos (ca. 250 B.C.–A.D. 10). This rich historical and numismatic analysis is followed by a 224-page catalogue which organizes the coins chronologically by reign, with further divisions into series and subseries. Posthumous and imitative issues are also included. Collector and researcher alike would have benefited from a discussion of the vexing problem of forgeries, and full publication of the important BN forgery trays should have been part of the cataloguing process.

Complete information is provided for each of the genuine BN coins; weight, module, inventory number, provenance, and die axis. All coins are carefully described, and an effort is made to list every known monogram variety ("subseries") and the number of such coins held in other major cabinets. The excellent plates illustrate obverse and reverse of all the BN specimens, plus almost 500 other important pieces. Bopearachchi lists (pp. 415–30) relevant data for each of these additional coins, including weight and inventory number where possible. Finally, the work is enhanced by five indices, two maps, and five tables.

Overall the printing and proofreading of the text have been satisfactory, but punctuation is inconsistent and typographical errors sometimes distort the actual titles or dates of the references. For example, in the bibliography, one can find an article by Sudha Narain (*JNSI* 1956) attributed to A. K. Narain, a misspelled title and wrong date for Holt's *RN* hoard article, and even the wrong title for the

author's own article in *NC* 1990. Among the more notable bibliographic omissions is Simonetta's essential 1958 follow-up article to the 1957 *E&W* study listed by Bopearachchi on p. 444. Elsewhere, a tetra-drachm of Diodotus is mistaken for a drachm and incorrectly listed as Series 3d (though the proper weight is given on p. 148, n. 8). Finally, it is odd that the total number of Bactrian and Indo-Greek coins in the BN is consistently given in the text as 1,227 (pp. 8, 14, 35, and the back cover) while tables 1 and 2 (pp. 447–49) show that the total is actually 1,127.

In spite of these minor flaws, it is worth emphasizing that no more ambitious catalogue of the Bactrian and Indo-Greek coinages has ever been undertaken, and that Bopearachchi establishes a new benchmark for the cataloguing of these coins. For scholars and serious collectors, this work should replace the current standard reference, Mitchiner's *Indo-Greek and Indo-Scythian Coinage.* More casual collectors and dealers, as well as anyone unable to read French, will probably remain content to use Mitchiner's work, since it covers more related coinages, includes most of the main types, provides photographs alongside the coin descriptions for easy identification, and presents a conveniently straightforward (if somewhat naive) view on such matters as where every coin was minted. For quick and easy reference, then, Mitchiner may still serve the needs of many numismatists, so it is fortunate that Bopearachchi has cross-referenced his catalogue with the Mitchiner numbers so that the two may be used together with little difficulty.

One notable advance made by Bopearachchi lies in the comprehensive listing he tries to provide for all monogram variants. This has been done by incorporating the published literature and the collections of the BN, the British Museum, the Ashmolean Museum, the American Numismatic Society, the Staatliche Museen zu Berlin, the Smithsonian Institution, the Musée Guimet, the Boston Museum of Fine Arts, and several prominent private collections (notably those of Harry Fowler and Adrian Hollis). The importance of the monograms has long been recognized, but their precise meaning remains uncertain. Scholars have used them to reconstruct the details of Bactrian and Indo-Greek history, variously taking them to represent mint cities, workshops, or magistrates. Thus it is important that catalogues reflect precisely the distribution of these marks among the known coins. Bopearachchi has

done his work well, though a more rigorous search through auction catalogues turns up a number of additional subseries. To his credit, Bopearachchi also tries to add his own views on how these monograms should be identified and interpreted (see especially pp. 31–34). Bopearachchi narrows Lahiri's list of 441 monograms to 298 (not counting Kharoshthi letters in either case), which he further classes into fifteen "families." The author does not, however, make clear how these families are arranged, nor why in some cases a minor difference between two monograms is deemed meaningless while in other cases a comparable variation warrants listing as a separate (although sometimes die linked) monogram (compare, e.g., his numbers 76 and 273, 40 and 41, 59 and 61, 160 and 161). At least one monogram in the catalogue (Diodotus, series 6G) is not included among the 298 marks identified by the author (table 3, pp. 450–51), and occasionally the wrong monogram is given (p. 32, where monogram 63 is mistaken for 62).

To explain the mysterious longevity and mobility of some monograms, Bopearachchi proposes an interesting but untested hypothesis: contrary to Greek practice elsewhere, these Bactrian monograms were the trademarks of private companies which were contracted to produce the royal coinage (p. 33). The author's claim (pp. 32–33), that Newell himself concluded that one Seleucid monogram assumed a greater significance than that of a magistrate's mark, is misleading: in the reference cited, Newell mentioned this as only one possibility, and certainly did not abandon in its favor his strong stand on magistrate marks. In any case, Bopearachchi himself does not press the case and his general analysis makes no real use of his new theory. For example, he equates monogram 182 with a specific city, upon which rests his reconstruction of the reigns of Eucratides I and Menander (see p. 84).

Perhaps it should not be so surprising to find identical monograms used in different areas, or appearing on coins for several generations. After all, nearly 23 percent of Bopearachchi's 298 monograms also appear on Seleucid issues, some from very different places and time periods. Only 87 of his monograms actually appear on coins of more than a single king, and less than 3 percent are really long-lived. To argue, therefore, that the Bactrian monogram pattern is so unusual as

to require the extraordinary hypothesis of private coin producing firms seems unnecessary. How would such organizations have operated within the royal economy? What firms produced the coinages with *no* monogram trademarks? Such coins are listed for the reigns of 14 Bactrian and Indo-Greek monarchs. The later conjunction of Kharoshthi letters with Greek monograms more readily suggests the names not of cities or of companies, but of various groups of treasury magistrates. At Ai Khanoum, the treasury texts reveal sets of Greek and non-Greek magistrates' names, as well as some titles (e.g. *agora-nomoi, dokimastai*) which show fidelity to normal Greek administrative practices. Also, the unstruck bronze flans were recovered from the palace treasury, where the coins were presumably prepared. The operation of contracted "coin companies" within the various treasuries makes less sense than the normal functioning of royal officials. As Bopearachchi points out (p. 31), more study is required before the matter can be settled to the satisfaction of all Bactrian scholars.

Bopearachchi's reconstruction of Bactrian and Indo-Greek history, like those of all his predecessors, will not go unchallenged. His treatment of the earliest period of the Bactrian kingdom is sensible, but offers little that is new. Bactria's important relationship with the Seleucid Empire during the reigns of the Diodotids and Euthydemus I is thinly sketched; no attempt is made to sort out the coins and reigns of Diodotus I and II. Bopearachchi prefers the "high" chronology for the date of Bactrian independence, arguing that he knows of no Bactrian issues of Seleucus II, "ni même aucune importation de monnaies de ce roi en Asie Centrale" (p. 42). This may be true for bronze issues and archaeological finds outside of hoards, but it must be noted that the third Ai Khanoum hoard (Frank Holt, *RN* 1981, pp. 7–44) contained tetradrachms of Seleucus II and later. While these may merely have been brought to Bactria by the troops of Antiochus III, such coins *were* imported at some point into the economy of Central Asia.

A key chronological hinge is overlooked in the author's analysis of the coins of Euthydemus I (pp. 47–49). Bopearachchi notes some Seleucid features which appear on these coins and on some (in his view) posthumous imitations, but he misses the chance to tie these issues together through shared monograms (and a Seleucid anchor symbol) to

Euthydemus's acknowledgement of Seleucid suzerainty in 206 B.C., as attested by Polybius.

Bopearachchi separates the Bactrian and Indo-Greek coins in the name of Demetrius into two distinct reigns: the first Demetrius (ca. 200–190 B.C.) conquered Arachosia and Parapamisadae, while the second (ca. 175–170) was the foe of Eucratides I. (An ephemeral third Demetrius reigned ca. 100 B.C.) To the first Demetrius, Euthydemus's son, Bopearachchi assigns all the "elephant scalp" coins with Herakles reverse (pp. 49–55). The main difficulty here involves the awkwardness of having a very youthful king conquering "India" at the very outset of his reign and issuing (even beforehand?) a coinage that celebrates that achievement. This might be possible if Demetrius's invasion was undertaken under the auspices of his father, but Bopearachchi makes no such suggestion. Indeed all of the author's chronology is built upon neat and separate reigns of ca. 5, 10, 15, 20, 25, and 30 years. Although Mitchiner got us lost in a tangled forest of kings and sub-kings, it seems that some overlap of father-son reigns (again, on the Seleucid model) should be taken into account by Bopearachchi.

The interesting suggestion that kings Antimachus and Agathocles were enemies (pp. 59–62) makes little sense numismatically or historically. Since the similarities in the coinages of Euthydemus II, Pantaleon, and Agathocles betoken alliance and cooperation, why does not the same hold true for Antimachus, who (like Agathocles) introduced a royal epithet and struck the same commemorative coins? Bopearachchi notes (p. 61) the "parallélisme des monnayages commémoratifs," but chooses to see here a sign of rivalry rather than of common action.

Perhaps the centerpiece of Bopearachchi's historical narrative is his reconstruction of the reigns of Eucratides I and Menander I, probably the two most important kings in Bactrian and Indo-Greek history. Marshaling an impressive range of numismatic data (monogram transfers, evolution of types, and orientation of legends), plus the standard literary texts, the author painstakingly details the rival careers of these monarchs (pp. 65–88). There is first a round of warfare between Eucratides and Demetrius II, wherein the former conquered Bactria while the latter was away in India. Demetrius II then reconquered Bactria, but his rival survived a desperate siege and finally

overthrew Demetrius ca. 170 B.C. Then the story is all but repeated in a second war against Menander I. While the latter was away in the heart of India, Eucratides invaded his kingdom and captured his capital city (Kapisa, identified with monogram 182). This victory (not that over Demetrius) occasioned the issue of Eucratides' famous 20-stater medallion, the jewel of the BN collection. Drawn back north to recover his realm, Menander fared little better than Demetrius II: Eucratides won overwhelmingly and left his rival only the Sangala territory. Finally, when Eucratides was assassinated by his son Heliocles I ca. 145 B.C., Menander was finally able to recover his lost cities/monograms.

This intricate scenario has many admirable facets, but the whole hangs upon a fragile chronology for the reigns of Eucratides and Menander. Some will find it hard to believe that Agathocles had been dead for ten years before Eucratides rose to power, and that as a result there is no connection between the commemorative coins of either of these kings. More importantly, Bopearachchi's chronology would place a minimum of 35 years between the minting of Agathocles' series 9 drachms, of which only six closely die linked specimens are known, and their deposit in the Ai Khanoum treasury as part of the booty of Eucratides' wars. A closer chronology seems necessary to account for these observations.

At the other end, there is reason to question the strong temporal connection that draws together the reigns of Eucratides and Menander. It has long been known that Eucratides' *megas* type with charging Dioscuri was imitated by Timarchus in Media and Babylonia, and that these Eucratides coins must therefore have been circulating outside of Central Asia *before* 161 B.C. According to Bopearachchi, who does not cite the literature on Timarchus's coins, Eucratides did not introduce the coin type in question until after he had captured Menander's capital city in the period 155–150 B.C. Clearly the whole chronology must either be shifted by a decade or so, or the dates of Eucratides' war against Menander must be reconsidered.

The strictly Indo-Greek period draws much better coverage from the author (pp. 88-141), as one might expect given the evolution of this work and Bopearachchi's own interests (pp. 7–8). The author argues here more rigorously and convincingly, using hoard evidence and over-

strikes to establish his chronology. He shows familiarity with even the latest numismatic discoveries (e.g. the existence of a King Thrason, attested by a single new coin belonging to R. C. Senior). Historians should take note that Bopearachchi's new chronology for this period makes Strato II and his son the very last monarchs of the hellenistic age, outliving even the Ptolemaic dynasty by a full generation. What followed was a new era in the history of East and West, and what follows Bopearachchi's monumental work is likely to be a new era in the modern study of Bactrian and Indo-Greek coins.

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INO NICOLAOU. *Paphos II: The Coins from the House of Dionysos.* Nicosia: Department of Antiquities, Cyprus, 1990. 227 pp., 41 pls. ISBN 9963–36–415–2. No price stated.

Mrs. Nicolaou has long been the authority on Cypriot coinage, and this volume is but the latest of her endeavours in the field. *Paphos I* (I. Nicolaou and O. Mørkholm, Nicosia: Department of Antiquities, Cyprus, 1976) published a large hoard of Ptolemaic tetradrachms from the House of Dionysos. Its sequel, *Paphos II*, presents the numismatic finds from the House of Dionysos, the Odeion, the Gymnasion, and the Asklepion at Nea Paphos.

Scholars interested in the coinage of Roman Cyprus have relied on G. F. Hill's *Catalogue of the Greek Coins of Cyprus in the British Museum* (London, 1904) and D. H. Cox's *Coins from the Excavations at Curium, 1932–1953*, ANSNNM 145 (1959), both invaluable but somewhat dated. *Paphos II* gathers much information previously widely dispersed. This publication of the coins from the House of Dionysos, an elaborate villa at the island's Roman capital, will provide a much needed picture of the monetary circulation during the hellenistic-Roman period.

Nicolaou begins with a brief history of Cyprus, particularly Paphos, putting the coins in their proper context. The catalogue follows: the author has arranged it for easy access, serving both the numismatist working on an eastern site of this period and the archaeologist dating such a context. The catalogue conveys all the pertinent numismatic information: obverse and reverse types, metal, die axis, diameter,

weight, condition, stratigraphical notations, and very complete references. Unlike the coins from Curium, all the numismatic finds from the House of Dionysos come from secure contexts. The catalogue is divided into two sections, Cypriot and non-Cypriot coins and counter-marks. These are then subdivided chronologically and by mint where known. Copious photographs supplement the text. A thorough commentary expands on the catalogue and is especially strong in the Ptolemaic period and the discussion of countermarks. The charts, in a separate section, are perhaps the most useful aspect of the volume, presenting in visual form the relative proportions of local and imported coinages through time. Sections on a casting workshop, molds and flans, a Hadrianic hoard, and numismatic dating follow the charts. The author concludes with appendices on the coins from the Odeion, Gymnasion, and Asklepion, also accompanied by charts.

Overall, the catalogue is well organized, with the information clearly presented. There are just two points which might prove confusing. First within the Cypriot section, the author separates issues which refer to the *koinon Kyprion* as "local Cypriot issues" (551–56), distinct from provincial "Cypriot imperial issues" (510–50). This implies that the former category is distinct, issued by a single separate authority. The Claudian coins (551–53) are local products, issued by the *koinon*, an entity that perhaps was also responsible for provincial Cypriot imperial issues. Coins from this series sometimes include the name of the proconsul, Cominius Proculus, in the reverse legend. The Trajanic coins (554–56), also attributed to the *koinon* and grouped with the Claudian coins, are most likely Roman issues (I. Carradice and M. Cowell, "Minting of Roman Imperial Bronze Coins for Circulation in the East: Vespasian to Trajan," *NC* 1987, pp. 26–50). The Greek legends and Cypriot types show that these bronzes were intended to circulate on the island, but were minted to Roman standards of weight, die axis, and material, indicating that they were struck in Rome for Cyprus, perhaps as a beneficence. Second, the catalogue division between non-Cypriot provincial and imperial coinage is not clearly marked—a matter of a missing sub-title—and consequently, it is difficult to locate the imperial issues. At the end of the catalogue, Nicolaou makes a valiant effort to classify unidentified coins (652–839) into rough chronological periods, facilitating the dating of their contexts.

The commentary is as admirable as the catalogue. As noted already, the Ptolemaic section is particularly well handled. The Roman section is equally thorough, with only a few comments necessary. The issues of A. Plautius (526–36) are commonly ascribed to the period after 22 B.C., the year the province was transferred from imperial to senatorial jurisdiction. R. Szramkiewics (*Les gouverneurs de province a l'epoque Augustéen II* [Paris, 1976], p. 57) states that A. Plautius was consul suffect in 1 B.C. and proconsul for Cyprus in A.D. 1 and, accordingly, the coins may date as late as A.D. 1. Nicolaou prefers to attribute the capricorn and scorpion series (587–90) to Commagene, following Imhoof-Blumer (*Tier- und Planzenbilder auf Münzen und Gemmen des klassischen Altertums* [Leipzig, 1889] p. 48, 64) and Wroth (*BMC Galatia*, p. 112, 46), and states that they are found sporadically in Cyprus, perhaps reaching the island through trade. I agree, however, with Hill ("Greek Coins Acquired by the British Museum, 1914–1916," 1917, p. 24) and Amandry ("Le monnayage Julio-Claudien à Chypre," *Centre d'Études Chypriotes*, 1987, p. 26) that the series is Cypriot in origin. It is attested by finds from Paphos, Curium, and Karpasha, and present in the Gunther Collection in the ANS, which was formed on Cyprus. The capricorn and scorpion appear on numerous provincial issues—the capricorn was associated with Augustus—from all parts of the empire. The style of the coins is similar to the Cypriot Augustus and Gaius series, possibly indicating a close chronological tie. Moreover, the two series might have served a similar purpose. Just as the capricorn was associated with Augustus, the scorpion was linked to Tiberius (Parks, *Roman Coinage of Cyprus*, M.A. thesis, University of Missouri-Columbia, 1991). The capricorn and scorpio series could have commemorated Augustus's adoption of Tiberius, just as the earlier series associated Gaius with his adoptive father.

The charts follow the commentary, describing the circulation picture. The Paphos evidence confirms the distribution from other Cypriot sites (Curium, various Roman tombs, and the sites explored by the Swedish Cyprus Expedition). Jewish coins figure prominently, before abruptly disappearing after the *tumultum judaicum* in A.D. 117 when Trajan expelled the Jews from the island. Coins from Asia Minor and the Levant rise in number through the second century, accompanying the increased standardization of local coinages, and perhaps demonstrating

greater compatibility among such provincial currencies. Other material evidence—pottery, amphorae, glass—would clarify the apparent trade patterns.

Nicolaou makes a valuable contribution to Roman provincial coinage with this publication of the coins from the House of Dionysos. Eastern sites are difficult to analyze as they involve poorly known coinages, and accordingly their numismatic evidence is neglected. Nea Paphos was one of the most important hellenistic-Roman cities in Cyprus, and by virtue of its stratified coins, has produced important information on the trade patterns of the period.

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JOHN R. MELVILLE-JONES. *A Dictionary of Ancient Roman Coins.* London: B. A. Seaby Ltd, 1990. 329 pp. illus. ISBN 1-85264-026-X. £ 25.

From A.A.A.F.F. to zodiac, Jones covers an astonishing range of terms used in discussions of Roman coins, from the earliest Republican coins to coins of Anastasius I. Along the way, he includes entries on personifications and divinities, magistracies, figures that occur in types (e.g. Acca Larentia, Antinous), objects included in types (even as mint marks), economic terms, emperor's titles, general coin types (e.g. adlocutio), buildings that appeared on coins, modern weights (grains and grams), and metals.

Long entries include discussions of denominations (where ancient and modern uses of the word are discussed), law, mint magistrates, and mint workers. He includes notable abbreviations (CONOB), outdated words used to describe coins (e.g. amictus), ancient sources that mention coins (*Historia Augusta*), prominent imitators or forgers (Cavino, Belli), and broader subjects as collecting and collectors; architecture), and specific traditions, as artists, signatures or Charon's obol, and some not particularly numismatic terms, like clavus.

There are a couple that are outside of his stated chronological range, like Augustalis, referring to a coin of Frederick II, and bracteate; Melicertes appears, though she never shows up on a coin.

In his preface, Jones directs the reader first to his rather long entry under numismatics, where he traces the history of scholarship from the Middle Ages (an era when scholarship is anticipated, not practiced) to the Renaissance, when the first compilations were published, to modern works. He gives a separate entry for H. Cohen, librarian for the Cabinet des Médailles, Paris, which emphasizes Jones's opinion on the importance of Cohen's work, but no separate entry, surprisingly, for Mommsen, whom Jones admits (p. 219) "elevated the study of Roman coinage from being a subject which was of concern principally to collectors and antiquarians, to a level at which it became an essential part of the study of Roman history." His more detailed history ends with Babelon's work on Republican coins, though he goes on to name the most important reference books for Republican and imperial coins, and modern journals and bibliographic aids to consult. He also includes paragraphs on metallic content and scientific analysis.

Unfortunately, except for the standard reference works he cites in his numismatics entry, and the general bibliography he refers us to in his preface (found in his *Dictionary of Greek Coins*), there is no separate bibliography or citation of more specific works, such as the detailed works in scientific analysis of coins now available. I also miss a reference to Carson's *Late Roman Bronze Coins*; he gives no title for Sutherland's and Kraay's publication of the collection of Augustan coins at Oxford, which might confound a new researcher (for the record, it is, *Catalogue of the Coins of the Roman Empire in the Ashmolean Museum: I. Augustus*).

The entries are liberally cross-referenced. Under abbreviations and contractions, there are references to names, and legend; following the chain further, there are references to laws, retrograde and introitus under legend. Yet I detect a certain sloppiness in the final editing, not only because of the numerous typographical errors, but to some references that are not cross-referenced as closely as they should be. I offer only two examples from the A entries. Jones mentions in the entry for acrostolium that English writers often refer to the acrostolium as a prow-stem, but readers working with this common descriptive term would not be albe to find it without knowing the more technical term. Similarly, under albus, the reader is referred to asper, but there is no entry for the latter.

Jones includes Janus, and the reader must infer the definition of janiform from it; similarly, there is no entry under hot or cold striking, though he does have an entry for double struck and refers to both procedures in this entry. In the caption of a solidus of Licinia, he notes that she is holding a globus cruciger; there is no reference to globus, though there is one for cruciger.

For the great majority of entries on major types Jones gives fairly detailed analyses of the type and the variations found. While he does not give specific references, given the problem of space, he does refer the reader to the general time period. Often he will write of conflicting viewpoints and give his own solution, sometimes novel, but more often the conservative solution. For instance, he offers new solutions to the appearance of Amphitrite on the coins of Crepereius Rocus and the legend Bacchius on the coins of A. Plautius (the types were not discussed by Crawford, *RRC* 399 and 431, respectively), but rejects the interpretation that the elephant appears on the coins of Caesar because of the derivation of the name Caesar from an African word.

Jones sometimes enters into complicated discussions in a cursory manner, partly because of the nature of the book he is writing, but the reader may not always be aware that there are other parts of the argument that he develops under separate entries. I am especially thinking about a caption for a coin of Nero in the entry adlocutio, which refers in no specific way to the problem of the Julio-Claudian imperial mint or mints. He returned to the problem in two other coins of Nero illustrating altar and Janus and in the entry mints.

A few minor corrections to his entries should be noted. Under corona, Jones neglects to mention the coronae civicae found in the types of Brutus and Sex. Pompey; for damnatio memoriae, he does not mention the practice of countermarking coins of the offending emperor, countermarks which occasionally deliberately obscured the face of the emperor and obviated the need to pull the coin from circulation.

Although most analyses of types are quite detailed, the entry for galley does not list when the types appear, and he omits several Republican examples of Neptune in his rather cursory entry for the god. There is no reference to the sacrifice on the coins of Antistius Reginus from the Augustan era under the heading pig; nor the type of Titurius Sabinus in the Republican period of the rape of the Sabine women

under Sabini. Under bull I miss a reference to Julian the Apostate's coin and the legionary coins of Gallienus.

In terms of the production, Jones regularly translates Latin words and phrases. The illustrations, while not profuse, are sprinkled liberally throughout the text, with an emphasis on early imperial coins. Unfortunately several of the coins are badly reproduced and make finding the detail unneccesarily difficult.

The book is long overdue, with the last dictionary in English dating to 1889. Jones writes in his preface that he did not intend this volume to replace the older work, but to supplement it with findings of more recent research; yet the book stands nicely on its own. Jones has already published a dictionary of Greek coins, and promises a third volume on Byzantine coins. I suspect that all three volumes will be much-thumbed additions to libraries of collectors and numismatists and should be a great help to those more unfamiliar with numismatic terms, especially classicists, archaeologists, and historians, who will greatly benefit from the information Jones has presented.

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CLIVE FOSS. *Roman Historical Coins*. London: B. A. Seaby Ltd., distributed by B. T. Batsford Ltd., 1990. 335 pp., illus. ISBN 0–900652–97–7. £ 29.50.

This reference work provides collectors and historians with catalogue and commentaries of Republican and imperial Roman coins carrying specific historical types. Since Foss adheres to strict guidelines in his determination of coin types as historical, he abstains from discussing the use of coins as a medium of information of the evolution of iconography and portraiture. Consequently the work will be of marginal interest to students and scholars of art history.

Such a wide ranging work must, perforce, be selective. Foss, however, has listed over 10,000 individual coins and noted many variants, so that this book is a major improvement over the dated works of Hill and Sydenham. Explanations are sober. Listings are concise and, because of the limitations of space, cross-referenced to the standard catalogues where the reader can find illustrations of all main types. Collectors will

find the introduction (pp. x–xiv) and historical summaries of great assistance in elucidating many of their specimens. Illustrations have been judiciously selected, and the work is a worthy addition to Seaby's long tradition of informed guides for collectors.

Historians without expertise in numismatics can also turn to this work with profit. Listings are based on the standard catalogues, but Foss has tried to account for problematic pieces and chronological difficulties. For example, he corrects (p. 5) Crawford's order of the Sullan aurei L. SVLLA IMPE (C. 367/2) and IMP ITERVM (C. 359/1), for which see now T. R. Martin, *RSN* 68 (1989), pp. 19–44. The aes of the so-called Interregnum of 275–276 are noted as attributed to Gallienus.

Since the interests of the collector take precedence, the work does have several limitations for scholars. Absence of citations to the sources and scholarly literature restricts the book's usefulness. Certain deceptive listings also result such as the dubious coins of Nerva cited as evidence for his founding of the *alimenta* (p. 96, and see R. Duncan-Jones, *The Economy of the Roman Empire*, p. 291), the problematic identifications of children found in association with Fecunditas or Felicitas on coins of Julia Maesa (p. 194) and Julia Mamaea (p. 198), or the dating of the legionary coins of Gallienus (p. 220).

Finally, Foss omits the vast provincial and civic issues of the Roman Empire save for several notable cistophori of Asia (pp. 35–36 and 49). Many significant historical types refering to imperial achievements and visits, grants of titles and imperial cult temples, and dynastic games are thus excluded. Inclusion of these coins would have improved the commentary and listings of many imperial coins, as in the case of those commemorating visits by Hadrian (pp. 109–10) or Caracalla (pp. 182–83).

Despite these limitations, Foss's book is an essential addition to the libraries of collectors, and it is a useful reference and introduction to most historians who often find daunting the standard catalogues.

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PAULA J. TURNER. *Roman Coins from India*. Royal Numismatic Society Special Publication 22 = Institute of Archaeology

·The first modern record of Roman coins from the Indian subcontinent dates from the fourth quarter of the eighteenth century. Subsequently the officers of the East India Company and their successors, employed by the British colonial government, recorded a steady stream of new material throughout the nineteenth and into the present century. From 1948 this work has continued under the auspices of the Indian government's museum and archaeological service. The advent of the metal detector and easy access to the international coin market have accelerated the rate of discovery. The importance of the accurate recording of Roman coin finds in India has long been recognized, since they are a gratifying supplement to the scant literary sources detailing classical contact with South Asia.

Listing took on an important impetus following the discovery, by R. E. M. Wheeler in the late 1940s, of what he claimed was a Roman trading station at Arikamedu on the southeast coast. This site, identified with the "Podouke Emporion" of the *Periplus Maris Erythraei*, while it produced no coins, yielded quantities of Augustan *terra sigillata*. The reciprocal part of the trade, implied by the coin finds, is archaeologically intangible, consisting as it did mainly of perishable exports—spices, muslin, food stuffs, exotic timbers, incense, wildlife, and human beings. Pliny and Strabo also record the import to Rome of precious stones, especially diamonds, carnelians, sapphires, and beryls. A single Indian object is recorded in the Roman world, an ivory statuette of Lakshmi, buried in the wreckage of Pompeii by the eruption of Vesuvius in A.D. 79.

Despite the paucity of physical evidence, the importance of trade with the Mediterranean was such that princely embassies regularly made their way to the emperors from Augustus to Constantine. Plutarch records that, in a burst of fervor, a member of an embassy, a "sophist" (?sadhu), burned himself to death in Athens and was commemorated there by "the Indian's tomb." The volume of trade, and the consequent deficit to Roman public finance, was sufficient to excite the concern of Tiberius, and Pliny records an annual outflow of 50 million sestertii from Rome to South Asia for the purchase of luxury goods.

The present work is the most comprehensive listing of coins yet attempted and supersedes all previous compilations, both in regard to completeness and accuracy of compilation. Dr. Turner has pursued her material the length and breadth of the subcontinent, and her achievement has been to replace the work of her predecessors, whose various publications are apostrophized as "... deficient in detail, and many more deficient in accuracy." We are offered a systematic relisting of all extant hoards and surviving fragments of hoards, together with an examination of published accounts of long-dispersed material. Cataloguing is to *RIC* reference for imperial coins, and oddly to *BMCRR*, rather than to Crawford's now standard work, for the few Republican issues that have been found in India. Although the work covers finds from the reign of Augustus to that of Constantine, the emphasis is very much on the first and second centuries, the period from which the overwhelming bulk of finds date.

Indo-Roman coin hoards fall into two distinct groups: Julio-Claudian hoards are of denarii, later hoards of aurei. The distinction between these groupings appears to have been brought about by fluctuations in the value of the denarius initiated by Nero's reform. Up to that date the admired stability of this coin seems to have given it an international trading status. Debasement, not merely by loss of weight but in terms of alloy also, cost the coin its reputation among traders outside the area where Roman authority could enforce a nominal value. In contrast, post-Neronian gold maintained its value as bullion down to the reign of Septimius Severus. It may be significant that Severan gold is the last recorded in the hoards and, it may be suggested, trade was maintained for some time in older coins, which were of a recognized unitary weight standard, rather than in those of the declining weight standards heralded by the issues of the sole reign of Caracalla. It seems certain, however, that trade declined during the imperial crisis of the third century.

The distribution of the hoards opens up a number of questions. There are two foci, the southern tip of India (effectively the area south of the rivers Ponnani and Cauvery) and along the Cormorandel coast in an area stretching from Pondicherry in the south to Madras in the north. The effect of this distribution, in southern India, is to highlight the fact that the trade represented by the coins depended upon an under-

standing of the effects of the east-west monsoon winds, which allowed shipping to cross to southern India directly from the Red Sea. The Augustan and Julio-Claudian coins of the earliest hoards gives the date at which this navigational breakthrough was achieved, and offers a terminus post quem for the compilation of the *Periplus*.

Further, the clustering of hoards in the gap between the Nilgiri and Anaimalai Hills indicates that this was a zone of transshipment rather than primary production, the ports of trade being on the western coast, and a portage system was employed across the south in order to save the lengthy, dangerous navigation around Cape Comorin and the beat north against contrary winds. The distribution of the later gold hoards is a little different from the silver in that the bulk of them are inland from the west coast, as well as in the Nilgiri Gap, suggesting a development of local exports in addition to the traditional entrepot service for produce of the Indian Ocean basin. There is also a diffusion of gold, though on a lesser scale, into the Indian hinterland, suggesting a widespread regional contribution to the goods exported to the Roman world.

This book is an invaluable contribution to the scholarship of Roman overseas trade which would have been improved by treating the coins in the context of Indian monetary affairs. True, we are told that Roman coinage was not integrated with native currency systems, but there is no clear statement of what these systems were, nor the governmental apparatus which supported them; we are offered a study of foreign coinage in a vacuum. Further, for students unfamiliar with the detailed geography of India—and surely coin hoards need to be studied in topographical as well as numismatic terms—the maps are completely inadequate. Proximity to settlement, roads, rivers of major natural features cannot be deduced from the evidence presented.

These are regrettable blemishes in a work which will be vital to a wide variety of scholars other than numismatists, and they could have been avoided by the application of a firm editorial hand. This reviewer would have liked to learn why Ceylon produced a currency based on the miserable billon GLORIA EXERCITVS issues of Constantine, how the prototypes arrived in the area, and what this phenomenon represents in Indo-Roman trade in the fourth century. At least Turner has opened up the prospect of future inquiry on a firm and scholarly numismatic

base. On this base it should be possible to pose a number of questions which could be answered on the ground in India. Foremost is what the material impact of the influx of large sums of precious metal may have been in the areas in which it was hoarded. Was there an elite which controlled the trade, and if so was this expressed in the nature of domestic or religious sites in the form of ostentatious spending? Did trade lead to population increase, evidence by increased site densities? Did the decline in trade have a visible impact? Questions of this nature are stimulated by the presence of the coins; accurate recording and cataloguing offer a firm chronological framework of inquiry. Now the coin evidence needs to be *used*.

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DIETRICH BOSCHUNG. *Die Bildnisse des Caligula*. Deutsches Archäologisches Institut, *Das römische Herrscherbild* 1, 4. Berlin: Gebr. Mann Verlag, 1989. 138 pp., 52 pls. ISBN 3–7861–1524–9. DM 190.

A half century ago the German Archaeological Institute inaugurated an ambitious project to collect and publish in a series of volumes entrusted to different scholars all the surviving portraits of the Roman emperors and their families. Progress has been unusually slow and the *Römische Herrscherbild* project is far from complete today. In fact, the latest fascicle, on the portraits of Caligula, is only the first of at least ten planned volumes in part 1 devoted to Julius Caesar, Augustus, and the emperors, empresses, princes, and princesses of the Julio-Claudian dynasty, as well as to Galba, Otho, and Vitellius. Dietrich Boschung, the primary author, and Hans-Markus von Kaenel, who contributed a chapter on the numismatic portraits, were not even born when the series was begun. Both are students of the late Hans Jucker, to whom the Caligula portraits were originally assigned, but who had not completed his work when he died in March 1984. At that time his two protégés were given the considerable body of photographs and casts that Jucker had assembled over many years as well as Jucker's notes, and this enabled the two younger scholars to complete their manuscripts in the fall of 1986. The resulting monograph, published three

years later, is appropriately dedicated to their teacher and the title page
duly acknowledges that the volume was written "auf Grund der Vorar-
beiten und Materialsammlungen von Hans Jucker."

Like the earlier fascicles of parts 2 and 3 of the *Römische Herrscherbild*
series, the primary goal of the volume on the portraits of Caligula
remains the collection of all surviving likenesses of the emperor and the
reconstruction of the lost prototypes that lie behind the many replicas
produced throughout the empire, sometimes at a great distance from
the capital. The aim of such a "Replikenrezension" is to isolate the
most faithful copies of each of the emperor's portrait "types" and to
distinguish such "true" replicas of the master images created in Rome,
usually in gilded bronze, from those copies, generally in marble, that
depart, sometimes markedly, from the officially approved types.
"Urbild," "Haupttypus," "Nebentypus," "Variant des Haupttypus,"
"Umbildung," etc. are terms that quickly become familiar to anyone
studying Roman imperial portraiture.

The portraits of the Julio-Claudian emperors and their families
present special problems because so many of the Julio-Claudians look
alike—in their official likenesses, that is, if perhaps not in life. "Bild-
nisangleichung" was sought for all members of the ruling dynasty and
Julio-Claudian portraits have such an intentionally homogeneous
"look" that the isolation and identification of individual portrait types
is at times exceedingly difficult. The problems are even more acute in
the case of those like Caligula whose portraits were often recut after
their deaths to approximate the appearance of their successors or, in
some instances, of their divine predecessors.

In the absence of surviving statues with inscribed bases naming the
persons portrayed, scholars have for centuries turned to coins for
labeled portraits of Roman notables. Thus it is no surprise that
numismatic evidence has always played a large role in the study of
Roman portraiture. The evidence provided by coins has, however,
frequently been used uncritically by archaeologists and art historians.
All too often those publishing Roman portraits examine and illustrate
as comparanda only a few randomly selected pieces, most often those
reproduced on the plates of the British Museum's multi-volume
catalogue or specimens readily available to them in local collections,
whether they be comprehensive cabinets like those in London, New

York, Paris, etc. or the small study collections in the possession of some university museums. Reliance on such a sample can easily lead the art historian astray. The coin portraits need to be subjected to their own "Replikenrezension" and to achieve this a die study is required. Only the earliest dies in a given series are likely to be faithful reproductions of the official (three-dimensional) model provided to the mint. All subsequent dies will be copies, occasionally with pronounced variations, of the profile portraits engraved on the first dies. For use in sophisticated modern studies of imperial portraiture, only coins struck from the earliest dies in each series will suffice. The present editors of the *Römische Herrscherbild* series are cognizant of this and hope wherever possible to enlist numismatists as collaborators, although they anticipate that qualified scholars will not always be available (p. 9).

In the case of Caligula's portraits, Boschung was fortunate in having von Kaenel as his partner. The latter is the author of *Münzprägung und Münzbildnis des Claudius*, AMuGS 9 (Berlin, 1986) as well as an article on Caligula's coinage, "Die Organisation der Münzprägung Caligulas," *RSN* 66 (1987), pp. 135–56, written at the same time as his *Römische Herrscherbild* text. Von Kaenel's chapter in *Die Bildnisse des Caligula* (pp. 13-26) treats the official coinage ("Reichsprägung") exclusively. Other coins bearing the portraits of Caligula ("Provinzial- und Lokalprägung") are not examined. They are, in the opinion of von Kaenel (and I concur), more valuable as documents of the "Rezeption" of imperial imagery in the provinces than as a means of defining the official portrait types themselves (p. 16). Gold, silver, and aes coinage are, however, all studied.

The portraits of Caligula on the aurei and denarii are all in right profile; those on the sestertii, dupondii, and asses are all in left profile. Von Kaenel concludes that all of the imperial issues reproduce a single official portrait type and that what variations exist are of a stylistic and not of a typological nature. Furthermore, since the two profile views are not mirror images, von Kaenel suggests that they faithfully reproduce the left and right side respectively of a single model in the round and he believes that comparison with marble replicas of Boschung's "Haupttypus" confirm that the same master "Vorbild" lies behind both the sculptured and numismatic replicas. According to von Kaenel, the Roman die engravers were provided with either a single

head in the round to serve as a model for their miniature profile portraits or with two separate relief portraits corresponding to the left and right sides of a sculptured head of Caligula's "Haupttypus." This is an important observation and it would be interesting to know if it is typical of Roman numismatic portraiture for left- and right-facing portraits of the same person to be rendered differently or whether the coinage of Caligula is exceptional in not employing mirror images.

Whatever the answer to the larger question, Caligula's coins unfortunately cannot be cited as incontrovertible evidence that Roman die engravers had models in the round from which some copied the left profile and others the right profile. Von Kaenel assumes that the coins he has collected and analyzed are almost exclusively products of the imperial mint at Rome, but there is a growing consensus that while Caligula's aes issues were struck in the capital, the bulk if not all of his gold and silver coinage was produced at Lugdunum (Lyons). (See, most recently, W. E. Metcalf, "Rome and Lugdunum Again," *AJN* 1 [1989], pp. 51-70.) The fact that Caligula's left and right profile portraits on coins are different *might* mean that both mints worked from portrait models of the same type—the selection of one profile or the other could then be a kind of mint signature—but it could also indicate that one portrait was copied in the capital and another in Gaul. I therefore cannot agree with von Kaenel when he states (p. 17, n. 10) that the identification of Caligula's precious-metal mint has little significance for the analysis of the emperor's portraits on coins.

In the main section of *Die Bildnisse des Caligula*, Dietrich Boschung discusses the portrait sculpture of the emperor and the relevant literary and epigraphical evidence (pp. 27-103) and catalogues all known Caligula portraits, both in the round and on gems, including those refashioned as images of Claudius (pp. 105-24). Much of Boschung's discussion falls outside the realm of a review in a journal of numismatics and will not be evaluated here, but certain methodological issues properly deserve to be examined.

It is Boschung's contention that virtually all the surviving portraits of Caligula are copies of a single lost masterwork (the "verlorenes Urbild"). The vast majority of the replicas adhere more or less closely to what he dubs Caligula's "Haupttypus," while a small number are classified as belonging to either the emperor's first or second "Neben-

typus." Within the "Haupttypus" Boschung distinguishes between a "Kerngruppe" of five replicas that are "sehr genaue Kopien" and others that are "abweichende Repliken," "Varianten," or "Weiterent-wicklungen" of the "Haupttypus." This is a departure from the schemes of other scholars who have studied Caligula's portraits, where the emperor's preserved likenesses are divided into distinct types. In adopting his scheme, Boschung may have been unduly influenced by von Kaenel's research on Caligula's numismatic portraits. Even if all of Caligula's coinage was produced at a single mint, and that mint was located in the capital rather than in Lugdunum, there is no reason to assume that the number of portrait types employed for the coinage and the number of types used for statuary was the same. Although numismatic portraiture and portrait sculpture are closely related, they are not identical species. In any case, Boschung's attribution of almost all of the emperor's sculptured portraits to a single "Haupttypus" is questionable.

The key elements in the definition of a portrait type are physiognomy and coiffure. The latter is the more objective criterion but cannot be applied in isolation because different Romans could and did comb their hair in the same manner. Indeed, common coiffures are an essential ingredient of the "Angleichung" of Julio-Claudian dynastic portraiture. On the other hand, variations in hairstyle among portraits with similar physiognomies are usually the chief means of distinguishing the various portrait types of a single person. It is not uncommon for new types to be created at important stages of a Roman's career; open any book on Roman portraiture and you are likely to read, for example, about an emperor's "accession type" as distinct from the type in use when the emperor-to-be was merely a prince.

Boschung, however, argues that even very marked differences in coiffure, which have led others to define separate Caligulan portrait types, can be explained in terms of deviations from a common prototype. I am not convinced. Even Boschung does not assert that *every* Caligulan portrait is a replica of the "Haupttypus," and so, as I have already mentioned, he defines a first and second "Nebentypus" as well—although the distinctions he makes between "Nebentypus" and "Varianten des Haupttypus" are strained at times. In fact, there is so much variety in the surviving portraits of Caligula compared, for

example, to the far more numerous likenesses in marble and bronze of Octavian/Augustus, that one wonders whether it is appropriate at all to impose the rigid Germanic type-system upon the Caligulan material. Yet nearly all of the pages Boschung devotes to Caligula's portraits are filled with special pleading of that kind.

If there is more than one type for Caligula's portraits in the round, but only a single type reproduced on the coinage, as von Kaenel suggests, one may ask a general question of some significance: How valuable is numismatic evidence for the study of Roman portrait sculpture? My answer is that the evidence furnished by the coins is crucial but of limited value.

It is obvious that as the only source of consistently labeled Roman portraits, coins will always have to provide the basis for all identifications of public figures portrayed in statuary, narrative relief sculpture, and gems. On the other hand, there is no reason to expect that every change in portrait type will be immediately reflected on the coinage and that the coins can in turn establish the date of introduction of each new type. It is especially unlikely that changes in type would automatically be adopted at mints located outside Rome, even if their emissions are of an official character (like the "Reichsprägung" of Lugdunum as opposed to "Provinzial- und Lokalprägung"). For the definition and dating of "Bildnistypen" the Roman coinage is of only limited assistance.

Coins may also mislead us even with regard to the identification of portraits. It has often been observed that the earliest numismatic portraits of new emperors occasionally bear a striking resemblance to the obverse portraits of their immediate predecessors, no doubt because official portrait models of the new rulers were not yet available. In the case of provincial issues, the portraits of some emperors are very inconsistent and neither fidelity to life nor fidelity to established portrait type can be assumed. Roman coins may be indispensable to the student of Roman portrait sculpture, and I applaud the efforts of the editors of *Das römische Herrscherbild* to incorporate a significant numismatic section in each new volume, but the evidence the coins provide is unlikely to be as definitive as art historians would like.

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Ivo LUKANC. *Diocletanus. Der römische Kaiser aus Dalmatien.*
Wetteren: Edit Cultura, 1991. 346 pp., illus. No price stated.

This is a difficult book to review because it is like no other work that
this reviewer has ever come across. Stated briefly, its aim is to provide
a complete compendium of all the sources, ancient and modern, for the
reign of the emperor Diocletian. The book's contents may be summa-
rized as follows: 1) preliminary matter, including a brief and uncritical
chronological table listing the main events of the reign in three
languages (pp. 7–35); 2) a list of the inscriptions published in *CIL* and
elsewhere that name Diocletian, together with photographs of some of
them (pp. 37–71); 3) photographs of a number of portrait busts and
statues of Diocletian and of his palace at Split (pp. 72–97); 4) a fully
illustrated corpus of 528 gold coins of Diocletian preserved in 74
museums and a list of a further 1,477 specimens that have appeared in
sale catalogues (pp. 99–279), and 5) a very lengthy bibliography of
secondary works on Diocletian (pp. 281–343). The book is notable for
Lukanc's penchant for tabulating any statistic that can be tabulated,
no matter how bizarre, such as the table that lists museums according
to the quantity of gold coins of Diocletian in their collections and
another one that provides a chronological breakdown of the items
included in the bibliography. Lukanc is also extremely reluctant ever to
express his own views: apart from prefaces by two distinguished French
scholars, the book contains hardly any continuous text.

No doubt the epigraphic section will prove to be of some use as an
index to *CIL*, and the bibliography will be useful simply because it is so
extensive, even though it is as unselective as the rest of the work (thus
articles on Diocletian in encyclopedias appear next to works such as
Seston's *Dioclétien et la Tétrarchie* and Jones's *Later Roman Empire*).
However, the major part of the volume deals with the numismatic
evidence and it is here that the book's strengths and weaknesses are
most vividly highlighted. Its main strength lies in the thoroughness
with which Lukanc has collected his chosen material; its fundamental
shortcoming lies in the fact that the author, apparently for reasons of
nationalism, has chosen to concentrate exclusively on Diocletian and to
ignore his colleagues in the Tetrarchy, Maximian, Constantius, and
Galerius. This is indeed a drawback in the list of inscriptions, but it

becomes a crippling handicap in the treatment of the coinage, since the issues of the four colleagues were totally integrated.

What value the numismatic section of the book might have had is further undermined not only by Lukanc's decision to list just the gold coins and not to mention the silver or base silver issues (the argentei are currently being studied by Georges Gautier) but also by the totally perverse way in which he has catalogued the gold coins, for these are listed under the collection in which they are preserved today! Although Lukanc has also provided a concordance in *RIC* order, the main catalogue with the illustrations of the coins is in collection order. In this sense the book represents a step back from *RIC* 5, 2 and 6, and Pink's article in *NZ* 1931, all of which listed the issues chronologically by mint and included the coins of Diocletian's colleagues.

Furthermore, since Lukanc has not attempted to note die identities, anyone wishing to make a die study of the gold coinage of this period will need first to cut up a copy of this book in order to sort the coin illustrations into a sensible order and secondly to consult all the sale catalogues Lukanc has painstakingly listed, for he has not reproduced the illustrations from them. In any case, such a project would be fatally flawed because it would have omitted the contemporary issues in the names of Diocletian's colleagues.

The main impression, therefore, that one obtains from Lukanc's work is one of misguided effort. While he must be congratulated for his thoroughness in seeking out specimens in such little-known collections as the Castello del Buonconsiglio in Trento and the Istoriceski Muzei in Mihajlovgrad, it is unfortunate that he should have missed the gold medallion of Diocletian in Berlin, currently on exhibition (H. Dressel, *Die römischen Medaillone des Münzkabinetts der staatlichen Museen zu Berlin* [Dublin/Zurich, 1973], no. 177), and the specimens in the National Museum in Zagreb. In addition, his decision just to use museum collections and sale catalogues as the source of his corpus has led him to neglect other publications that include gold coins of Diocletian, such as catalogues of private collections (e.g., O. Voetter, *Sammlung Bachofen von Echt* [Vienna, 1903]); site finds, such as the unpublished aureus from Rome with reverse HERCVLI DEBELLAT, PR, published in *Coin Hoards from Roman Britain* 8 (London, 1989), p. 216; and hoards, including, most surprisingly, the finds from Beaurains (P.

Bastien and C. Metzger, *Le trésor de Beaurains* [Wetteren, 1977]) and the Mediterranean (R. A. G. Carson in *Mélanges Lafaurie* [Paris, 1980], pp. 59–74).

So, although the book will be of some use as quarry of material which specialists undertaking more detailed studies will be able to mine, it must remain a matter of regret that it would have been so much more useful if it had been planned more sensibly.

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MEDIEVAL

INGER HAMMARBERG, BRITA MALMER, AND TORUN ZACHRISSON. *Byzantine Coins Found in Sweden.* Commentationes de Nummis Saeculorum IX-XI in Suecia Repertis, Nova Series 2. Kungl. Vitterhets Historie och Antikvitets Akademien, Stockholm, and Spink & Son, Ltd., London, 1989. 108 pp., 37 pls., 10 maps. No price stated.

A new monographic series under the editorship of Brita Malmer was introduced in 1987 which presents specialized studies on the vast coin material contained in the Viking Age hoards. The previous Commentationes came to a halt after only two issues (*Kungl. Vitterhets Historie och Antikvitets Akademiens Handlingar*, Antikvariska Serien 9 and 19, 1961–1969) and consisted of articles, not monographs, as in this new series. The monographs are in-depth studies that complement the *Corpus Nummorum Saeculorum IX–XI qui in Suecia reperti sunt, Catalogue of Coins from the 9th–11th Centuries Found in Sweden* (hereafter *CNS*) and in some cases provide the foundation for the arrangements to be found in these new volumes. The *CNS* is a monumental undertaking—the publication of the entire body of more than 150,000 coins found in Sweden. Publication is proceeding by province, and thus far four fascicles of finds from Gotland parishes and one each of Skåne, Östergötland, and Dalarna have appeared.

The present volume on the Byzantine coins begins with Justin II "as a continuation of Joan Fagerlie's work on Late Roman and Byzantine

solidi" (preface) and continues through Nicephorus III (1078–81). It
brings together in one continuous series all of the Swedish finds which
have been only partially published in the *CNS* volumes where, in any
case, the arrangement is geographical by find number.

Responsibility for the contents of this volume is divided among the
three authors as follows: catalogue of the Byzantine series, identifi-
cation of dies, indices, and plates by Inger Hammarberg; catalogue of
finds and maps by Torun Zachrisson; planning, introduction, tables,
and catalogue of imitations by Brita Malmer.

Unlike finds of the preceding period, which consisted almost entirely
of gold solidi, the Viking Age finds contain only four gold coins. There
are, rather surprisingly, 23 copper coins, but the vast majority are silver
which is the decisive characteristic of the Viking Age hoards. Byzantine
coins form a very minor portion of this material but 660 + coins, most
of which are silver and include three notable clusters, is a significant
addition to the known Byzantine corpus.

An introductory chapter presents various analyses of the coin
material and finds. Particular attention has been given to recording
and analyzing the numerous incisions, graffiti, folds, etc. which are so
characteristic of the Viking Age material. Unfortunately, degree of
wear was not included because, according to Malmer, "wear cannot be
objectively measured, at least not in a practicable way" (p. 13). While
it may not have great relevance to the other secondary data, it is a very
important factor for dating the deposit of a find. This latter aspect is
not treated in this chapter.

Also singled out for more detailed analysis are the finds from Gotland,
since they form the major part of the find material not only in Sweden
but in Scandinavia and the Baltic area. The terminus post quem of the
finds or the dates of the coins are used in the chronological analysis.
Malmer also gives a preliminary survey of the finds in the Baltic area,
but the questions of "why" and "how" the Byzantine coins reached the
north, for the present, remain unanswered.

Focus centers on the catalogue of the coins, the raison d'être for the
volume, and on the catalogue of finds. The information provided for
each coin in the catalogue is fairly complete, but is in a very condensed
format following a standard devised for the *CNS* series. This infor-
mation includes find number, reference to a standard catalogue for the

coin type (in this case the Dumbarton Oaks catalogues by A. R. Bellinger and Philip Grierson), notes on variations or die identities, and six numbered columns including primary individual data (weight, diameter, and die axis) in columns 1–3 and secondary individual data in columns 4–6. Full explanation of the data and symbols in columns 1–6 is available only in the explanatory pages of the *CNS* volumes; it would be useful here. All the coins are illustrated, which compensates somewhat for the lack of descriptive information.

Noteworthy among this material are the five examples of the "Hodegetria" miliaresion of Romanus III (*DOC* 3a). All but one of the pieces have been marred in some way (three are fragmentary and one is pierced) and the Dumbarton Oaks collection includes only four specimens, all of which are imperfect as well. Other significant clusters of material include the 90 miliaresia of Constantine VII and Romanus II (945–49), 229 of Basil II and Constantine VIII (977–89), and 111 of Constantine IX (1042–55). Most of the types recorded by Grierson for this period are represented, and some important new varieties are noted which alter our understanding of particular series.

Sixty-eight imitations have been identified. They are listed in a new enumeration beginning with 1001, following the regular series. Again descriptive information is minimal. The imitations fall into three main groups: direct imitations (of a Byzantine issue), derivative imitations (of Byzantine types), and imitative Byzantine/Anglo-Saxon mules. The imitations were published previously by Malmer, and studies have indicated a northern Swedish Mainland (Sigtuna) origin for some types and a possible Danish origin for others.

The catalogue of finds is arranged alphabetically by parish, differing from the *CNS* volumes which have a primary arrangement by province. An index to the provinces, however, is provided. For each find the following information is given: date found, type of find (hoard, grave, settlement remains, single find, or unknown), date of find by terminus post quem, summary of contents and references to previous publications. We are not told what particular coin is the basis for the terminus post quem, but the distinctions by type of find are useful. More detailed information on the circumstances of the find and on the non-coin material can be found in the *CNS* volumes.

A number of indexes facilitate access to the material and two tables summarize the finds. The plates are excellent, and illustrate all of the existing specimens plus a number of archival coins already known from previous publications. The volume is a welcome addition to the corpus of Byzantine coinage, and to the growing literature on the Viking Age finds. The authors are to be congratulated for the thorough documentation of a significant body of material which will surely stimulate future study.

<div align="right">
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JOHN S. DEYELL. *Living without Silver: The Monetary History of Early Medieval North India.* Delhi: Oxford University Press, 1990. 369 pp., 36 pl. Rs 325.

In this seminal work, John Deyell discusses many neglected coin series of early medieval North India and, based on various types of analysis, forcefully argues for the reconsideration of many widely held characterizations of North Indian economic history. Although the work is not beyond reproach in its presentation and in some of its arguments and conclusions, it should attract keen interest from numismatists and historians of medieval South Asia as well as economic historians working outside the Indian subcontinent.

Indian numismatics has, as Deyell points out, neglected early medieval coinages due to their crude appearance and the dearth of information that they convey about mints, dates, and rulers. Indeed, because little has been published on these coinages, economic historians have inferred that contemporary economies of North India were under-monetized and thus largely feudal. Deyell's monograph, then, is sorely needed, if only to fill in lacunae and stimulate discussion of rash judgments.

The monograph, however, provides a great deal of food for thought. The body of the work is divided into three sections: the Post-Classical period (ca. 750–1000), the Rajput period (ca. 1000–1200) and the early Delhi Sultanate period (ca. 1200–1250). Although discussion of the post-classical period is intended as background for the Rajput period, Deyell expounds in detail in this section about the coinage of the

Gurjara-Pratiharas, the Amirs of Sind, and the Turk and Hindu Shahis of Kabul and Gandhara. Chapters usually begin with dry discussions about coin types, chronologies, and metrology, but often also document phenomena more broadly relevant to monetary history. For instance, Deyell refers to the findspots for hoards of these coinages to prove the localized circulation of Gurjara-Pratihara coinage and a significant flow of silver in the form of Qarmati coinage from Sind into southern Rajasthan.

In his section covering the Rajput period, Deyell presents important findings in nearly every chapter. For the Ghaznavids and their underlings the Yaminids, he refutes the often hypothesized existence of private mints. For western India, he persuasively indentifies Gujarat coinage with the Gadhaiya paisa and establishes a chronology for its different issues. His tour de force, however, is his discussion of the coinage of the Tomaras and Chauhans. On the basis of fabric, he revises an improbable though widely accepted chronology for the rulers of Delhi and their respective issues of bull-and-horseman billon coinage. In addition, following the lead of P. C. Roy, he provides strong arguments for the attribution of all of this coinage to a mint or mints in Delhi. Finally, he studies the survival rate of different issues in various hoards to arrive at the half-life of these issues in circulation, that is, when about half of an issue is no longer circulating. Through this analysis, Deyell calculates that the Gadhaiya paisa circulated at a very high velocity, with a half-life of about twenty years.

Deyell's discussion of the coinage of the early Delhi Sultanate is less extensive. Because coinage from this period onward is better understood, less space is devoted to coin types or chronologies and more to broader monetary questions. For example, Deyell notes the westward flow of money under the Mu'izzids. He also observes the phenomenon of debased coinage in countries on the periphery of the early Delhi Sultanate as kingdoms in weaker economic positions lost their silver to the more powerful Delhi Sultanate.

Deyell concludes that there was no contraction in the use of coinage in most of northern India during the early medieval period. The general debasement of many coinages in this period probably resulted from an increase in demand for silver as the money supply expanded and silver supplies changed little. Moreover, the velocity of circulation remained

high or even increased. However, he stresses that situational factors are more relevant to the discussion of money than temporal or geographical criteria. Therefore, while important economic centers and trading posts relied on strong monetary systems, hinterland economies may not have done so. At the end of his monograph, Deyell includes a number of useful appendices and 36 high quality plates, showing 368 different coin issues of early medieval India.

Overall, Deyell's attractively published work relies greatly upon technical analyses which, presented tersely, require slow reading. Presumably in an effort to keep the size of this monograph to manageable proportions, he has relegated as much of the technical detail as possible to endnotes or to appendices. Moreover, where he must refer to this detail explicitly, he provides a large number of aids in the form of charts, tables, and maps. Only the maps fall somewhat short as they often lack sufficient detail to show what they are intended to illustrate. In many instances, topographical features are omitted and the reader must guess the precise locations indicated for hoard finds or dynastic boundaries. This can be remedied by reference to Joseph E. Schwartzberg's very detailed *A Historical Atlas of South Asia* (Chicago, 1978). Moreover, in giving maps of findspots, Deyell almost never distinguishes between regions which have no records or whose records he was not able to examine and those areas whose records show no hoards for a particular coinage. Thus while it is clear where he indicates coinage has been found, it is not so clear where he leaves an area unshaded that no coinage is to be found.

In addition, while Deyell's work should attract a broad readership, non-specialists in either numismatics or Indian history may have difficulty in evaluating some of his arguments or even understanding the relevance of his analyses to broader questions of social and economic history. For instance, Deyell does not always explain on what basis he distinguishes coin types. In his discussion of Yaminid bull-and-horseman coinage, he states that a coin type adopted in the eleventh century remained the norm for the Yaminid Punjab until the end of the twelfth century. However, his accompanying graph presents the analysis of a large number of coin types for each year of this period. Similarly, while each section of the work is usually introduced by a short historical synopsis of the region's history and is concluded with a

concise statement of his findings, these discussions are usually very terse, especially for central and eastern India, and seldom establish clearly the links between social, political, *and* monetary history. The non-specialist in Indian history, then, may wish to read a general history of the period before tackling this work. On the other hand, Deyell's work is, regrettably, intended only to provide a technical foundation for the monetary history of this period. Although he thoughtfully identifies in his conclusion many potentially fruitful avenues for further research, the synthesis of social, economic, and monetary history must wait until he or someone else probes further.

In statistical methodology, Deyell's work will bring greater sophistication to discussions of medieval South Asian numismatics. His work, indeed, should provide a model for others who wish to see what techniques are available, particularly in the regression analysis of hoards, and how they can be integrated into any piece of research. Minor caveats, nevertheless, should be added since he does not always make clear the full range of possibilities for some statistical methods or the assumptions which underlie them. For instance, in considering the total approximate quantities of coinage actually produced for an issue, he gives the misimpression that die analysis is only appropriate for hoards. Die analysis, in fact, is feasible for any body of coins recovered from any place and at any time so long the detail of the coins is well preserved.

In addition, given his broad geographical and chronological sample, the rate of survival for hoard groups or issues in hoard groups probably does document the degree of monetization of economies in this period. However, many circumstances can distort such an analysis. The interment of hoards, for instance, may have been accelerated by war or economic crisis. Deyell, in fact, notes that a large number of hoards were buried upon the foundation of the Delhi Sultanate when a new coin series was introduced and bad money chased good money out of circulation. An otherwise thorough discussion of hoard analysis is provided in one of his appendices.

Moreover, while Deyell gives great attention to the debasement of coins over the early medieval period, he alludes only in his conclusion and appendices to the substantial problems in ascertaining the extent of this debasement. For the most part, these problems do not substan-

tially affect his conclusions since the debasement figures only generally in his arguments. However, many of the determinations of precious metal fineness cited in his work are specious. Precious metal content in coinage is most frequently measured through streak analysis and specific gravity analysis, although both of these methods have drawbacks. Streak analysis, for instance, is easily distorted by surface enrichment and, in any case, is not very precise over repeated trials. Specific gravity analysis, on the other hand, requires precise laboratory instruments and reliable technique which can not always be replicated from one laboratory to the next. Moreover, trace amounts of lead or gold can easily distort results due to their heavy specific gravities yet they are rarely identified through other sorts of analyses and allowed for in the calculation of finenesses. Because most of the determinations which Deyell draws upon are derived from specific gravity analysis, his citations of percentages of fineness should be treated as approximate even to the extent of units of percent; fractions of a percent should be ignored altogether. His citations of precious metal content for trimetallic alloys, moreover, are even less trustworthy since they generally assume a proportional composition which can only be verified through significant destructive chemical analysis or neutron activation analysis. These sorts of preliminary analyses clearly have not been carried very far. As Deyell states in his conclusion, major and thorough new research needs to be carried out in this area. Perhaps, in confronting this problem, the researcher should consider differences between actual metal composition and various approximate calculations for it as derived from methods of metallurgical analysis popular in the Middle Ages.

Deyell's monograph is a welcome addition to the fields of South Asian numismatics and economic history generally. As it stands, both numismatists and economic historians will probably try to emulate his methodological resourcefulness and general thoroughness. Yet the full import of this work will only be realized as researchers pursue the broader social and economic implications of his technical analyses. For these reasons, the work should provide an interesting read for many serious scholars.

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KENNETH JONSSON and BRITA MALMER, EDS. *Sigtuna Papers. Proceedings of the Sigtuna Symposium on Viking Age Coinage 1–4 June 1989.* London: Spink & Son, Ltd. Kungl. Vitterhets Historie och Antikvitets Akademien, Commentationes de Nummis Saeculorum IX–XI in Suecia Repertis, nova series 6, 1990. 339 pp., illus. ISBN 91-7192-804-9, ISSN 0284-7205 No price stated.

The 39 short papers published from the 1989 symposium "On Viking-Age Coinage" represent scholars from a variety of disciplines. Their numismatic, historical, and archaeological research on coins and monetary objects from the British Isles to the Slavic lands during the Viking and early medieval centuries offers a wide range of insights into economic activities and the uses of wealth in those times.

The international conference and its publication occurred as part of the fortieth anniversary of the much praised *CNS* project, an investigation and database of ninth through eleventh-century coins from Sweden. There are so many interesting and unique papers that it is difficult to do them all justice in a review. The only real problem with the volume is a lack of structure. In her introduction, Brita Malmer correctly emphasizes the interdisciplinary nature of the symposium contributions, but otherwise she is not very helpful. Although current "trends" in numismatics are mentioned (if "detailed artifact analysis, an interest in debates and a general alignment toward basic research" [p. 9] can legitimately be called trends), Malmer makes no specific comments on the contributions that follow. This is unfortunate since the papers, as presented, interact naturally with one another and would have benefited from an effort at topical organization and evaluation, thus giving the book the semblance of a more unified whole. As it is, the papers are presented alphabetically by author, and the reader must search patiently through the titles for any notion of the topics covered.

Many of these papers individually encompass a variety of numismatic issues, yet it remains helpful to consider them from a topical point of view. Efforts to reconstruct political and economic history include Mark Blackburn's and Carl Becker's papers providing convincing evidence which illuminates gaps in the historical record of Danish royal succession (in the time of Cnut the Great and of Svend Estridsen in the 1040s respectively). With frequent historical and archaeological

references, the contributions by Thomas Noonan, Peter Sawyer, and Alfred Lieber, taken together, produce a lively, though sometimes overstated, debate on the subject of whether the Vikings were raiders or traders and how dirhams came to the Baltic. Noonan looks closely at dirham hoards concluding that what may appear to be simply one trade route between the Baltic and Islam is really two separate spheres of exchange with European Russia acting as the intermediary. Sawyer takes a more theoretical approach, defending Karl Polanyi's view of markets while arguing against Richard Hodges's "Dark Age economics" which, Sawyer says, neglects or misunderstands the historical evidence. Sawyer also seems to have an innate mistrust of archaeology. As a cautionary example he offers: "there is virtually no archaeological evidence for the trade between England and the Baltic that the customs accounts show was on a large scale in the 14th century" (p. 285). Yet his own argument falters when we realize that such evidence would presumably come from the sites of fourteenth-century wharves which today are often inaccessible or destroyed by subsequent construction unlike Viking wharves in shallower waters. If certain evidence has been destroyed, this fact, too, can be observed archaeologically. With archaeology—and history can claim no more—there are some questions which will not find sufficient evidence for a satisfactory understanding. This collection of papers itself shows the advantages for scholars of keeping themselves open to different avenues of inquiry; the validity and usefulness of each academic approach depends on the matter at hand.

Archaeological materials of direct numismatic interest were addressed by, among others, Kirsten Bendixen on coins from early Ribe, Kenneth Jonsson and Majovor Östergren on the Gotland Hoard Project and the Stumle hoard in particular, Alexander Belyakov on monetary objects from barrows near Pleshkovo Village (on the Volga River), and Jiří Sejbal on the pre-coin monetary use of axe-shaped iron bars in Moravia. The report on Ribe finds is one of the least interesting as it lacks any interpretation of the evidence, being merely an identification of coins from the site with some added information on contexts. Jonsson and Östergren, on the other hand, tackle the problem of Gotland's vast quantity of hoarded silver using data from the archaeological excavations, cadastral maps, pollen studies, and topographical

analysis. They assert that Gotland acquired its silver by being a center
for transit trade, not from the sale of locally manufacturd goods. In the
authors' view, trade *did* matter more than plunder for the accumulation
of Gotland's wealth.

   Topics involving monetary circulation in the Viking period proli-
ferate. Michael Metcalf offers an interesting set of arguments con-
tending that the 991 English tribute was paid in obsolete coinage, a
significant factor to be taken into account when dating Scandinavian
hoards. Arkadi Molvõgin follows the route of Anglo-Norman pennies
moving into the Baltic and especially to Estonia; again, the effect the
Gotlanders had on Baltic trade, this time in the twelfth century, are
highlighted. Alfred Lieber's aforementioned article on the massive
importation of dirhams, and its sudden cessation, dwells on the
processes of monetary and wealth circulation and the modern
perception of a silver crisis beginning in the late tenth century: "The
existence of a silver crisis is . . . a myth which was created by imputing
to an earlier age much later concepts of the acquisition and use of
wealth, and by neglecting the significance of historical developments"
(p. 211). Without taking an uncompromising stand on the trade vs.
plunder argument (and wisely so), Lieber does emphasize the Viking
activities of tribute taking and raiding. He also believes that the so-
called *farmen* from Gotland made large profits taking short breaks from
their argricultural activities to act as ferrymen providing boat transpor-
tation for raiders crossing the Baltic (p. 209). Although this seems
feasible for the *farmen*, one wonders how effective raiders lacking their
own boats could be. (Many of the contributors to this volume offer
much to illuminate Gotland's role in the Viking period, but their
separate and often conflicting conclusions leave the reader wishing for
some straightforward record of interactive discussion.) Without so
much interest in the mechanism of exchange, Vladislav Kropotkin
discusses the caravan route along which passed the tenth century Volga
Bulgarian dirhams found in the Baltic. Less well known than the
movement of dirhams westward is the appearance of west European
denarii in the north of the former Soviet Union; Vsevolod Potin has
discovered there a preponderance of Frisian coins from the latter half of
the eleventh century which he regards as in all probability due to the
superior regulation of their quality.

Other special topics covered in this volume include the production and purposes of imitative types, the application of style and motif analysis to specific coinages, and several metrological investigations. Gert Rispling reconstructs a bit of political history among the Volga Bulgars with an impressive die study of coins struck from both imitative and authentic dies. Alexander Belyakov's intriguing study of monetary finds from the barrows of Pleshkovo Village (a Finnish Meryan settlement) divides the finds functionally into two categories according to ethnographic uses (decorative) and cult uses (after the manner of "obols of the dead"), and he comments that "neither earthly nor unearthly life was thought of without money" (p. 36). It is possible for one coin to serve both functions, and coins with different functions may occur in the same context. In a basically pre-coin economy, a coin's essential functions are seen as "decorative, magical and, if necessary, [as] money" (p. 36). Belyakov contends that foreign coins acquire their magical significance because their markings are mysterious and such mystery brings power: "These functional loadings fully corresponded to the syncretism of ancient art" (p. 36). In other articles, Ryszard Kiersnowski discusses coin motifs conferring messages of authority, and Jarmila Hásková considers the transference of Anglo-Saxon and Scandinavian motifs to Bohemian coinage. Elsewhere, Marina Sotnikova looks at Scandinavian imitations that convert a Russian symbol of authority into an image of Odin as raven and speculates what these coins might mean for the origins of the Russian state. This is but a sampling.

Finally, a review of this volume is not quite complete without observing that the 1989 Sigtuna symposium is the only meeting this reviewer has known to include in its publication its own theme song—an amusing conclusion to a highly provocative and informative set of papers.

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CARLO M. CIPOLLA. *Il fiorino e il quattrino; la politica monetaria a Firenze nel Trecento*. Bologna: Il Mulino, 1982. 135 pp. L 10,000. Trans. by the author as *The Monetary Policy of Fourteenth-Century Florence*. Berkeley, Los Angeles, London: University of California

Press, 1982. xiv, 112 pp. ISBN 0–520–04606–4. No price stated.
CARLO M. CIPOLLA. *La moneta a Milano nel Quattrocento; monetazione argentea e svalutazione secolare.* Istituto Italiano di Numismatica, Studi e Materiali 1. Rome, 1988. 67 pp., 8 pls. ISBN 88–85914–24–1. No price stated.
CARLO M. CIPOLLA. *La moneta à Firenze nel Cinquecento.* Florence: Il Mulino, 1987. 178 pp. ISBN 88–15–01181–1. L. 20,000.

European coinage from 1300 to 1600 has a special significance for numismatists. The coinage systems shared many aspects with those which went before: striking was by hand, money was to a great extent defined by precious-metal coinage, and there was a variety of minting regimes ranging from centralized minting for large agricultural territories to the competing mints of mercantile city-states. The period differs from the ancient and medieval eras in offering significant quantities of archival sources which permit an understanding of economic and political forces underlying monetary phenomena. In three succinct studies of single mints in different centuries, Carlo Cipolla has explored many of the economic aspects of coinage that can only be guessed at for earlier periods.

In coinage as in most aspects of life, the fourteenth century was a period of crisis in Florence. In addition to the Black Death of mid-century, sudden changes in the gold:silver ratio (from 10:1 to 14:1 and back to 11:1 within a few decades), the bankruptcy of the state treasury, and civil unrest brought monetary crises which the government sought to quell with new, often debased, issues. Competing coinages of neighboring communes and the free market for silver, however, limited the options, especially if the mint was to remain a source of income rather than expenditure to the state. By analyzing a few specific episodes, Cipolla is able to show how the political interests of various groups were reflected in changes of the coinage and how the economic sophistication of the politicians developed. A particularly intriguing example is the effort of the "popular" government installed by the Ciompi revolt of 1378 to lower the value of the gold florin in relation to the silver-based coinage used to pay artisans. An attempt to value down the basic coin of the silver system, the quattrino (thereby giving more silver to the lira of account), brought the predictable result

that no silver bullion was brought to the mint. The next solution was to withdraw quattrini from circulation to raise the buying power of the coin by decreasing the volume of silver in circulation. This seems to have begun to work until an influx of Pisan silver coins brought the price of the gold florin back to its earlier level. A change of government in 1382 ended this remarkable experiment in monetary policy.

For the fifteenth century, Cipolla turns his attention to Milan, where a series of minting contracts allow a detailed examination of silver-based denominations over time. The results are expressed in clear tables supplemented by explanatory text. The first table traces the debasement of the coinage of Milan as a whole (from 21.8 grams of silver in a lira of account in 1401 to 9.4 grams in 1474) as well as the intrinsic value of the various denominations (in 1474 a lira paid as a single large fine grossone coin had 9.4 grams of silver, while one paid in 240 base denari had only 7.6 grams; intervening denominations followed the pattern). Table 2 shows the varying mint tolerance allowed for coins: the grossone was allowed a tolerance of only 0.5% while the denaro was allowed more than 3% variance above or below the decreed weight. Table 4 compares the same coins in terms of their profitability to the mint; while the grossone gave a much larger seigniorage per coin (0.5d per grossone versus 0.03d per denaro), each grossone piece carried a much smaller percent of its total value as mint profit (0.2% of the nominal value of a grossone was profit to the state, against 2.6% of the value of a denaro). In table 5, minting costs (brassage) are added to profit (seigniorage) to show that the grossone bore only 1.2% of added value while the denaro bore a total of 20.6%; a mark of silver resulted in 25 lire of value when coined into grossoni and 31 lire as denari. Table 7 illustrates how the debasements of Milan in the course of the fifteenth century compared with those of its chief monetary competitors, Venice and Florence.

Cipolla's study of sixteenth-century Florentine money is based on extensive use of unpublished archival data. Unlike the cases explored in the other two studies, there was relatively little debasement of the silver coinage in the Cinquecento. A policy of stability characterized the monetary goals of the grand dukes of Tuscany: maintenance of the intrinsic standards of the silver coinage, restraint in the minting of low denominations, and protection from the circulation of foreign coins.

The stability of standards, however, masked a dynamic bullion movement, brought about mainly by the great imports of first gold and then silver from the New World, through Spain and then to the Florentine mint. The analysis given to the ruler by his advisors shows an understanding of the monetary and economic effects of the rise in volume of bullion, but his determination to maintain a stable monetary system resulted in the virtual disappearance of gold from Florence after mid-century. The huge amount of silver coinage produced at the mint left the city as quickly as it entered, with the result that little coinage was available for transactions and the economy became increasingly dependent on bank money. A banking crisis brought on the paradoxical result of deflation and fall in prices in the midst of the greatest silver glut Europe had known.

While the coinage of early modern Italy differs in many specifics from that which preceded it, these succinct and careful studies point up many of the economic conditions which underlay all pre-modern coinages and the strategies devised by minters for profiting from them.

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MARJORIE TRUSTED. *German Renaissance Medals. A Catalogue of the Collection in the Victoria and Albert Museum.* Alan Sutton Publishing Ltd., Gloucester, 1990. 128 pp., ill. *ISBN* 1–85177–013–5. No price stated.

The existence of a fine series of German Renaissance medals in the Victoria and Albert Museum has been known chiefly through notations to the respective entries in Georg Habich's monumental pioneering work *Die deutschen Schaumünzen des XVI. Jahrhunderts*, often with indication of the former owner, Salting, Soulages, or others. Marjorie Trusted, Curator in the Sculpture Collection, Victoria and Albert Museum, has now succeeded in compiling a comprehensive, handsomely printed catalogue of 204 pieces, all illustrated and described in detail, thus making the material available to a wider circle of scholars and students. As the preface relates, the groundwork for the catalogue was laid by Dr. Matthias Senn and later edited by Lucy Cullen. The author consulted with eminent specialists in the field in order to include

additional information and discoveries made subsequent to publication
of Habich's Corpus, thereby expanding the descriptions for future
study.

A number of medal catalogues have appeared during the past decades,
but this is the first time that we are presented with a museum inventory
dealing with German Renaissance medals exclusively, and further this
is a collection of representative breadth and it is unusually rich in pieces
of great importance. Just a few of the most outstanding treasures
include: a Solnhofen stone model of Martin Pfinzing by Gebel (72),
wooden models by Hagenauer (85, 86, 87), the Konrad Peutinger medal
by Hans Schwarz (155), Christoph Weiditz's wooden model of Joachim
Rehle (180), and the wood and gesso games piece of Margarete von
Frundsberg (190). There are many others.

The work is preceded by a well researched and carefully annotated
introduction sketching the origins of the German medal. The influence
of Italian masters is shown and how it interacted with existing German
traditions of wood and stone carving, goldsmithing, and seal engraving.
The author also examines the techniques of medal production and how
the new art was perceived by society. Here it could perhaps be added
that a well-developed love for heraldry north of the Alps gave a
profound impetus to the shaping of reverse types, while Italian
medalists and their patrons showed a greater preference for designs
based on classical art and literature, no doubt because of a more natural
closeness to Latin culture. But it was a swell of admiration for the
newly found individualism associated with things Italian that helped
the spread of medal making into Germany, as it furthered the adoption
of Italian styles in architecture and painting, of commercial and
financial patterns, even the use of the Italian language by the educated.

Marjorie Trusted describes how the medal collection in the Victoria
and Albert Museum came into being during the second half of the last
century, when a holding of over a hundred pieces was purchased, origi-
nally formed by Paul de Praun, a renowned Nuremberg collector who
died in 1616. She gives an intriguing outline of the history of the de
Praun collection, only part of which found its way into the Victoria and
Albert Museum, while other sections are now in the Louvre, the
Hermitage, and the Budapest Museum of Fine Arts. Later important
additions came from the M. Jules Soulages purchase between 1859 and

1865, the George Salting bequest 1909, and acquisitions from the Frédéric Spitzer Collection, all with determined emphasis on aesthetic appeal and quality. An excellent bibliography is given, covering a broad spectrum of literature on the subject and constituting a welcome updating of earlier bibliographies. There are indices of persons represented and of the Museum's accession numbers dating back to 1852.

The listing of the medals presents the reader with a slight inconvenience: the arrangement is alphabetical after artists which, for instance, places Hans Schwarz and Christoph Weiditz towards the end, which separates "Nuremberg 1525/6/7" from Matthes Gebel and other Nuremberg masters, and "Unknown Augsburg Master" from Weiditz. Following Habich's order by schools and within schools a chronological listing would have resulted in a more organic and easier to consult catalogue. But a study of the entries makes the reader soon forget these reservations. The selection of pieces that make up this collection bears witness to the exquisite taste and expertise of those who assembled it. Above all, the series of Matthes Gebel (no less than 46 pieces including 2 signed ones), Christoph Weiditz (8 pieces), Friedrich Hagenauer (11 pieces), and Joachim Deschler (11 pieces) are remarkable for an assembly this size. Most of the items are cited although not always illustrated in Habich's corpus, but in many cases the present catalogue publishes material for the first time. The collection is particularly rich in wood and stone models so characteristic of the schools of the early German masters, rivaling those in other famed, and more specialized, museums in Berlin, Munich, Nuremberg, and Paris, for example. The individual entries are clear and comprehensive and the observations by other scholars included with many of them enhance their usefulness.

There are some specific observations and comments that should be made. The medals of Charles V, Ferdinand I, and Maria (27 and 28) are attributed to Peter Flötner, while Habich's attribution to that artist was only tentative. More recently, Klaus Pechstein, *Peter Flötner*, 1984, has expressed doubts as to any medallic activity by Flötner. On 6 the abbreviation in the legend HIERONY⁹. PAVMGART A P presents a puzzle. It could possibly stand for Academiae Patronus (or Pater) and would then refer to Hieronymus's role in the founding of the Altdorf Academy. The lead medal of Louis II of Hungary (10) is based on the anepigraphic stone model now in the Boston Museum of Fine Arts; a

silver specimen with reverse Stephan Schlick (formerly in the Marquis de Hohenkubin collection, present location unknown) has a slightly different legend, apparently applied to the mold with letter punches. Deschler's Magnus Dilher (21) offers another good illustration to medal making: the Habich piece has an anepigraphic reverse, evidence that the legend was not part of the model but was subsequently impressed into the mold. With 23, 24, and 25, the author sums up various opinions as to possible date of origin of the "Dürer" medals, now generally believed to belong to the "Dürer Renaissance." Very interesting is the inclusion of correspondence between Willibald Pirckheimer and Erasmus, Latin with English translation (26). The Habich citations at 30 should read just 945 and 957, while 944 and 958 refer to a medal only 22 mm in diameter. Number 31 belongs to Habich 961 and 38 to Habich 970, not 170. The translation of the reverse legend of 56 is "born Adler," not "born a noble."

Matthes Gebel's pewter medal of Francis I (74) is from the original state of the stone model, before part of the beard was tooled away. A silver specimen, also from the original state combined with the Fortuna reverse of the Ottheinrich medal Habich 1054, appeared at auction Felix Schlessinger, Berlin, May 2, 1933, but its present location is unknown. For both of these medals, Francis I and Ottheinrich, there exist uniface hollow casts with exceptionally fine incuse reverses, VAM 74 and the bronze in the Staatliche Münzsammlung, Munich. The struck medal by Ludwig Neufarer (125) is a counterpiece to an analogous medal of Charles V and Ferdinand. The Weiditz model of Joachim Rehle (180) with its canting reverse device shows how coats of arms were created by the rising merchant class adopting the trappings of nobility.

The catalogue adds a number of features helpful to the scholar as well as to the neophyte. In the case of 43 bronze and brass medals the spectroscopic composition analysis results are given. The non-destructive analyses were performed by Graham Martin in a non-invasive manner explained in a footnote. These tests indicate that most of those medals consist of mainly copper and zinc (brass), although they were in the past believed to be of bronze (copper and tin). Such a record of chemical composition will be of immense value in future investigation.

With many entries Latin and German legends have been translated, at times somewhat freely, and often their origin cited. The photography is excellent, taken from the pieces themselves, and conveys a good "feel" of the medium. The provenance information goes back to the middle of the nineteenth century, and in many instances dated prices are given; we can read with envy that the Albrecht Dürer medal by Matthes Gebel (36) was purchased in 1866 for 10 shillings, and Weiditz's boxwood model of Ulrich Ehinger (182) in 1861 sold for 3/13/6. Those were the days!

Marjorie Trusted's meticulous description of each item deserves comment, as does her introductory essay. Both will certainly stimulate and facilitate further research and study. Perhaps more careful proofreading of German titles could have eliminated a number of typos. All in all, the numismatic community is much indebted to Ms. Trusted for her fine contribution to the literature on the German Renaissance medal and for making this magnificent collection more accessible. Her book will be an integral part of any library on the subject.

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MODERN

MIGUEL ÁNGEL PORRÚA, ed., *La Casa de Moneda de México a más de 450 años*, 2d ed. Mexico City: Miguel Ángel Porrúa, 1989. 302 pp., illus. ISBN 968–842–170–7.

This work first appeared as a publication of the Casa de Moneda de México. Miguel Ángel Porrúa's desire to bring out a second edition and the cooperation of Napoleón Gómez Urrutia and other officials of the Mexican government and mint in the fulfillment of the project will place this outstanding study in the hands of a wider circle of readers.

Quite simply, this is the finest, most extensively illustrated account of the parent Mexican mint ever to be published. It may be usefully employed in conjunction with the first volume of Alberto Francisco Pradeau's monumental *Historia numismática de México*, where it will serve admirably to bring the reader abreast of events during the last

four, tumultuous, decades of Mexican numismatic history. But it will also stand on its own: its reliance on original documents is habitual and scrupulous, and its illustrations are, in general, useful and carefully chosen. Of paramount importance, it relates Mexico's numismatic history to larger, especially economic, events in the nation and the world. This, and the fact that it covers *all* of the central mint's numismatic history (not merely the years since independence) make the appearance of this book something of an event in Latin American monetary reportage.

While Miguel Ángel Porrúa pulled the entire effort together, the research and text for the majority of this book were the products of a team of three other numismatists, Oscar Castañeda Batres, Lorenzo Hernández, and Agustín Pineda Aguilar. Their work is excellent, and it is a tribute to Sr. Porrúa's editorial skills that the final text flows smoothly and appears to be the work of a single author rather than several disparate voices.

The greater portion of *La Casa de Moneda de México* is a historical survey broken down into fairly predictable units. Thus pre-conquest exchange occupies an initial chapter, "Los instrumentos de cambio precoloniales," while the establishment of the first of Mexico's several successive metropolitan coining facilities receives treatment in the next section, "La fundación de la Casa de Moneda y las primera acuñaciones." A third chapter breaks down the story of the nation's remaining colonial coinage into three unequal pieces, corresponding to the era of *macu-quina* (cob) production, lasting from the 1530s to the 1730s; the period of early mechanization of the Mexico mint, whose centerpiece was the *moneda columnaria*, issued from 1732 to 1771 and perhaps the colony's best known and best loved coinage; and the period of *busto* design, wherein the beaky Charles III and his homely successors abandoned the marvellous pillars and globes design of *columnaria* issues in favor of unflattering realistic portraits of themselves. This coinage continued for nearly five decades, down to the end of the colony in 1821. This chapter contains much useful information, some of it new—at least to this reviewer. For example, I had not known that one reason for the change of silver design in 1772 was to obscure the fact that the silver content of the coinage was being reduced at that time. This watering down of the intrinsic value of Mexico's coinage in the

name of monetary reform has continued to the present day—although it is a worldwide, rather than a Mesoamerican, phenomenon.

Two short chapters deal with the war of independence and the first Mexican empire of Agustín de Iturbide. In the first of these sections, the authors discuss emergency coinage, both insurgent and royalist, inspired by the political and economic crises of the period. They posit this irregular coinage against the continuing regular output of the colony's "official" mint at Mexico City. In the second, they continue their welcome practice of extended citation of relevant documents, along with detailed information about actual coinage output.

"La República Federal" deals with one of the topics of a recent ANS Symposium, predecimal and decimal coinage of the Mexican Republic down to the 1890s. The authors follow a plan of organization reminiscent of that of T. V. Buttrey and C. Hubbard in their *Guide Book of Mexican Coins*, and there is relatively little new information in this portion of the book. This chapter also contains a brief section on the short-lived second Mexican empire of Maximilian.

"La cuestión monetaria en la Era Porfiriana" does present new data for Mexican numismatists, and a goodly amount of it. The decline in silver's value against gold, one of the nation's most pressing monetary problems in the late nineteenth and early twentieth centuries, is given detailed treatment. And this uneasily bimetallic monetary system is skillfully posited against another major trend of the day, the appearance and proliferation of private, note-issuing *bancos*, whose products had no direct competition from the national government, and which occupied a growing niche in the monetary scheme of things down to 1914. This chapter's treatment of the relationship between the fluctuation in the value of silver and its effects on Mexican coinage strikes me as especially worthwhile, and it also typifies the authors' desire to explain *why* a particular issue of Mexican coinage exists in quantity or scarcity, not only that it is common or rare.

"La moneda de la Revolución (1913–1917)" views the coinage of the Mexican civil war in an interesting new light. The authors observe that

> Toda verdadera revolución implica la negación del orden establecido, de sus instituciones y de sus signos convencionales. Y una de ellas es la moneda.

[Every genuine revolution implies a denial of the established order, its institutions, and its conventional traits. And money is one such institution.]

They view the coinage of the Mexican Revolution in this light: the insurgents rejected the government of usurping President Huerta, along with his "legal" coinage. During the next four years the insurgents attempted to replace the central government and its money with experimental makeshifts of their own.

The authors rely on Wood and Sánchez Garza for the actual organization of these materials, and there is little in the way of new information on the emergency coinages of Oaxaca, Chihuahua, Durango, Guerrero, and the other centers of insurgent moneying. But their observations on the nature of revolutionary money are worthwhile, and they may be applied to many other revolutionary situations.

The final chapter of the strictly historical section covers the period from the early 1920s to the middle 1980s, years of great change for Mexico's coinage and for her coiner, the Casa de Moneda. Silver played a dwindling role in the nation's money as new coins, which inevitably contained progressively lessening proportions of the precious white metal, emanated from the mint, had their brief time in the sun, and were then replaced by newer arrivals of even lower intrinsic value. While all this was taking place, the mint, which had occupied the same site since 1848, found itself unable to meet the growing demand for its products. This prompted the establishment of two new facilities to attempt to keep up with the work. The first of these was built on the outskirts of the capital in 1970 and the second, one of the most modern facilities in the world, began working in the old mining center of San Luis Potosí (site of an earlier state and national facility between 1827 and 1893). Together, these three coining agencies, all of which employ the same, hallowed mark, a large M with a smaller o above it, can meet any coinage need in Mexico's foreseeable future. Ironically, rampant inflation and the widespread substitution of paper for metallic money removed much of the pressure from Mexico's coiners just as they were finally becoming capable of meeting their full responsibilities to the nation's inhabitants and economy. It is perhaps for that reason that the mint's personnel are becoming increasingly aggressive in finding

nonstandard targets for their wares, including collectors and foreign governments.

The concluding section of *La Casa de Moneda de México* is, in my judgment, one of the most valuable parts of a valuable book. Here, in a 60-page illustrated essay called "El proceso artístico y tecnológico para la producción de monedas," the authors take us from the very beginnings of the modern coining process, with the choice of metals and their various qualities, through the choosing of a design, the translation of that design from a large preliminary drawing to a final steel die, and through the processes of rolling, blanking, striking, and verification of coinage quality. Full treatment of the three current branches of the Casa de Moneda, including their layouts, operative machinery, and effective capacities, are given, along with a wealth of photographic evidence. The current director of Mexico's mint, Napoleón Gómez Urrutia, provides a final "Postfacio" on the facility's position vis-à-vis the Mexican government and within the larger society.

La Casa de Moneda de México a más de 450 años is one of the most ambitious projects of its kind ever to emerge from the Americas. In the wealth of information it affords the specialist, I find it fully comparable with Taxay's *The U.S. Mint and Coinage* for United States researchers. The citation of documents, the great number of color illustrations, and above all the authors' consciousness of the importance and historical sweep of the object of their examination—all of these elements have created a noteworthy numismatic event. There are the usual number of typographical errors one might associate with a work on this scale, and a few mistakes have also crept in along the way in the illustrations (most egregious among them the unexplainable inclusion of a Bolivian colonial *silver* coin on p. 64, and its description as a Mexican *gold* one). But these are minor considerations, and they can be cleared up in a later edition. The authors' prose is excellent, Sr. Porrúa's editing seamless. They, and he, are to be congratulated for having created a real event in the continuing story of Mexican numismatics.

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W. J. D. MIRA and W. J. NOBLE. *The Holey Dollars of New South Wales. A Pictorial Record of Known Surviving Specimens.* Sydney: The Australian Numismatic Society in association with the Mint and Barracks Museum, 1988. 92 pp., illus. ISBN 0–9590796–1–0.

The holey dollars of New South Wales occupy a similar position in the Australian series to that held by Massachusetts silver in the early American series: they are the earliest coins struck in that colony. They acquire an added romance from their often peculiar find spots: some come from a Tasmanian bushranger hoard, three others were found doing service as washers in Australian plumbing. They were struck in 1814 at the orders of Governor Lachlan Macquarie, who sought to remedy the lack of circulating medium in the colony by copying the solution used in the West Indies: a hole was cut out of 40,000 Spanish pieces of eight, giving a ring which circulated at a value of five shillings and sixpence, plus an inner "dump" which had a value of fifteen pence; at six shillings and threepence this was well above the bullion value of the coin. New South Wales had no shortage of men with skills as diesinkers (no fewer than nine contemporary struck counterfeits survive, plus five cast counterfeits), and the official dies were made by a convicted Birmingham forger, William Henshall.

Since fewer holey dollars survive than do examples of Massachusetts silver, photographing all known surviving examples is a reasonable project, but even so it could not have been easy to assemble details and photographs for 275 holey dollars. The corpus is based on the photographs of 190 dollars assembled by Philip Spalding while working on his book, *The World of the Holey Dollar* (Santa Barbara, 1973). (One collection which might have an example the authors did not include is that of the Casa de Moneda de México.) Unfortunately, the book offers little more than it says: a pictorial record of known surviving specimens of holey dollars. Although statistics are given about the dates and mints in the front of the book and provenance is given for the pieces so far as known, the descriptions are very meager indeed. Weights are not given, nor are die axes. It is clearly a catalogue for collectors who want to determine what are the rare mint and date combinations so that they can make reasonable bids whenever holey dollars come on the market. Furthermore, the "dumps" are not illustrated; instead there are only

three pages on the dies of the dumps. Thus this book offers a corpus of the rings, but not of the dumps.

The corpus does not go into detail about the history of the holey dollar, referring the reader to Spalding's book. Spalding's book, however, was privately published in a limited edition nearly two decades ago and is difficult to obtain. Nor can it be described as scholarly treatise: much of it is a popularized account of early Australian history. Although Spalding provides an adequate discussion of the coins, he consulted only published sources about the background of the issue of the holey dollars and did not consult any archives.

Neither Spalding's work nor the corpus by Mira and Noble are thorough scholarly treatments of the holey dollar. They are, however, solid beginnings which form sound foundations for scholarly work. Particularly useful are the photographs and detailed accounts of the most modern forgeries. East Asia has the dubious distinction of harboring some of the most dangerous forgers in the world, and the holey dollar is a perfect target. In compiling a record of the "Manila" and "Hong Kong" forgeries, the authors have done dealers, collectors, and scholars alike a great service. One only wishes similar corpora were available for other issues of the period, such as regal and private counterstamps on Spanish dollars after 1797, or the Bank of England and Bank of Ireland dollars with visible undertypes of 1804. A study of the regal counterstamps might help us determine which are the genuine counterstamps, which the contemporary counterfeits, and which the modern forgeries—one of the most difficult questions in modern numismatics.

The audience for this volume should not be restricted only to those who are interested in the Australian series: the Canadian numismatist will want to study it to compare it with the issues of Prince Edward's Island; the Caribbean specialist will want to compare these holey dollars with those of Guadeloupe; the researcher in Brummagem halfpennies and other counterfeits will want to examine more products of a Birmingham forger. I have already used Mira and Noble's findings to estimate what proportions of Spanish silver from which mints were passing through English hands during the Napoleonic period. There is no question that anyone interested in silver movements during the Napoleonic period, in the spread of Mexican silver throughout the

world, and in British colonial issues (in the widest sense of the word) will find this a very useful volume.

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John M. Kleeberg

The American Numismatic Society
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Colin R. Bruce II, and Marian Moe, eds. *Collecting World Coins. A Century of Monetary Issues*, 3rd ed. Iola, Wisc.: Krause Publications, 1990. 624 pp., illus. ISBN 0–87341–146–3. $ 19.95.
Chester L. Krause and Robert F. Lemke; E. Wilhite, ed. *Standard Catalog of U. S. Paper Money*, 9th ed. Iola, Wisc.: Krause Publications, 1990. 204 pp., illus. ISBN 0–87341–148–X. No price stated.
John Hickman and Dean Oakes. *Standard Catalog of National Bank Notes*, 2nd ed. Iola, Wisc.: Krause Publications, 1990. 1,249 pp., illus. ISBN 0–87341–122–6. No price stated.
Russell Rulau. *U. S. Merchant Tokens 1845–1860*. Iola, Wisc.: Krause Publications, 1990. 224 pp., illus. ISBN 0–87341–137–4. No price stated.

The firm of Krause is well known to collectors and has published hobby materials since the 1950s. Its flagship publication is the *Standard Catalog of World Coins*. Although dealers mockingly refer to it as "the telephone book" (because it is a large, unwieldy, oversize paperback), it is largely responsible for the market for non-United States coins in this country. Even if the prices are nominal, dealers still prefer to handle coins for which estimates exist, no matter how vague, rather than coins for which they have no idea of the value. *Collecting World Coins* is a junior version of the "telephone book"; the *Standard Catalog* includes all coins since 1800, *Collecting World Coins* only those since 1900. The *Standard Catalog* has page upon page of non-circulating legal tender coins, *Collecting World Coins* tries to exclude them. Unfortunately, *Collecting World Coins* by no means excludes non-circulating legal tender coins systematically. Although it is a pleasure to pick up a book which does not have fake coinages like those of Andorra, there are eight pages of issues by San Marino, most of them obviously struck for collectors; all the East German pieces above two marks are also commemoratives; and this list could be extended indefinitely. A catalogue

which rigorously excluded coins struck for collectors would be welcome indeed. Since many people collect to fill in gaps in a book, such a catalogue would enable them to steer clear of the shoals of Andorra and the Marshall Islands. *Collecting World Coins* is not such a catalogue. Many of the smaller countries in the Third World are not represented. Even in Europe there are peculiar omissions: a collector seeking to complete a type set of coins of Nazi-occupied Europe will find good listings for the Protectorate of Bohemia and Moravia, for Slovakia, and for Serbia, but he will not find Croatia; it has been omitted for some reason. One advantage *Collecting World Coins* has over the *Standard Catalog* is that the paper is better, and so the photographic reproductions are much clearer than in the "telephone book." Even so, the photographs of Ottoman minor coins are still terrible.

The *Standard Catalog of United States Paper Money* has a very close rival: Robert Friedberg's *Paper Money of the United States* is already in its eleventh edition. Both catalogues claim to be complete, although this is not true, since both lack the $100,000 gold certificate with Woodrow Wilson. Both catalogues are excellent; the choice between the two depends on what you need. The *Standard Catalog* is very quick and easy to use if you need to find the value of a note, since all small size $1 bills, for example, are found together, whether they be United States notes, silver certificates, Federal Reserve Bank notes, or Federal Reserve notes, or one of the issues for North Africa and Hawaii. Friedberg lists the notes first by the type of note, and then by denomination. His catalogue is difficult to use in response to a telephone inquiry. The *Standard Catalog* also has a formula to calculate the value of National Bank notes. The section I have found most useful is the part on error notes and their values; Friedberg has nothing comparable. The section on counterfeits is also very welcome, and as good as it can be considering the Secret Service ban on holding counterfeits of United States currency. On the other hand, for the collector who is interested in varieties of notes and their histories, Friedberg is vastly superior. Friedberg explains the backgrounds of the issue of each note and the authorizing legislation; the *Standard Catalog* has a general introduction for all large size and small size varieties. Friedberg's paper, photographs, and typography are also superior; some of the photographs in the *Standard Catalog* are very poor, and all are smaller than Friedberg's.

In an attempt to be as complete as possible, the *Standard Catalog* includes a section on treasury notes issued by the United States government between 1812 and 1861. This is not very useful; despite the authors' claims, most of these are clearly bonds rather than paper money. A $5,000 note which expires in sixty days paying six percent *cannot* be used as paper money except during times of hyperinflation, which 1847 was not. (For bonds, Gene Hessler's *Illustrated History of U. S. Loans* is more useful.) The section on 1812–1861 would have something new if it contained prices (Hessler does not attempt to assign values) but of 79 varieties listed, values are given for only seven.

The Standard Catalog of National Bank Notes by Dean Oakes and John Hickman is already in its second edition, which is remarkable for such a specialized area of collecting. Economic historians who study the period 1863–1935 will find information in it which is hard to obtain anywhere else. The student of banking history can learn that the National Bank of the Commonwealth, New York, was another victim of the crash of 1873. The monetary historian can study regional variations in the demand for bank notes and analyze regional money supplies. The book is in part based on research done in the National Archives; unfortunately, no sources or footnotes are given for any of the information, so the reader cannot tell what comes from the National Archives and what from contemporary reference works about banking. Both footnotes and a bibliography would be extremely helpful for future editions.

Incidentally, both the *Standard Catalog of U. S. Paper Money* and the *Standard Catalog of National Bank Notes* garble their accounts of the reason for the success of national gold banks in California and their failure in the East. In the East, greenbacks and goldbacks were both considered legal tender, so Gresham's law operated, and goldbacks could not make any headway so long as greenbacks circulated. On the Pacific coast, however, the legal tender laws were disregarded, and greenbacks were treated as foreign exchange, with fluctating prices in terms of the local currency, namely gold: the daily quote for "legal tenders" was always the first line in the stock market report of the *San Francisco Chronicle*. So greenbacks could no sooner drive gold out of circulation in California than Brazilian cruzeiros can drive dollars out of circulation in the United States. Hence the only national gold bank founded in the East, the Kidder National Gold Bank of Boston, never

seems to have succeeded at putting its goldbacks into circulation; but no fewer than nine national gold banks were founded in California.

Russell Rulau's *U. S. Merchant Tokens 1845–1860* is in some respects the most ambitious of all these publications; if the cataloguing and attribution of coins and United States paper money can be reduced to a system, this is not the case in tokens, where serendipity and esoteric knowledge rule. We know as much as we do about United States tokens because they have been collected and studied assiduously since the 1850s. The founders of the American Numismatic Society, for example, seem at times to have preferred hard times tokens to dekadrachms. Rulau's catalogue is the third of six catalogues of United States nineteenth century tokens, which divide tokens into *Early American Tokens* (1700–1832), *Hard Times Tokens* (1833–44), *Merchant Tokens* (1845–60), *Civil War Store Cards* (1861–66), *Trade Tokens* (1866–89), and finally *Tokens of the Gay Nineties*. All but the Civil War store cards (which was done by George and Melvin Fuld) have been written or updated by Rulau. There is no good reason for these separate volumes; they exist because two periods (the Hard Times and the Civil War) were actively collected very early, and so later cataloguers began to work around them and fill in the gaps. There is no difference between a merchant token and a trade token; Rulau just wanted some variety in the titles of the catalogues. Since all these catalogues are now published by Krause, I hope they will consider some day retitling the catalogues *United States Tokens*, volumes 1 through 6.

Many of the "tokens" in the catalogue are not true tokens, but large cents or subsidiary United States or Spanish colonial silver with counterstamps. I have no objection to their inclusion; in fact, tokens and counterstamped coins are clearly closely related in this period; but much of this material overlaps the work of Gregory Brunk, *American and Canadian Countermarked Coins*. Like Brunk, however, Rulau unfortunately does not tell us the mint mark of the undertypes of the counterstamped Spanish-American coins. For those of us who would like to find out the proportions of Spanish silver circulating in the United States from Mexico, from Lima, and from Potosí, this is a serious omission. Since Rulau does not tell us in which collections he saw the various pieces, it is also impossible for us to retrace his steps and look at the coins again making notes of the mint marks. Sometimes

we can tell the mint mark from the photograph; often, however, it is not good enough or shows the wrong side of the coin.

Rulau's attributions seem reliable; often, however, there is no way to check, because he almost never gives his sources, whether city directories, old county histories, newspapers, censuses, or whatever. No footnotes are provided. This is a serious disadvantage in such a difficult field. Most of the time he seems to be referring to city directories, but he says he used specialized publications on gunsmiths, silversmiths, and vaudeville as well.

The various Krause catalogues are handy as quick references or at the very beginning of a research project. The more ambitious catalogues (those on National Bank notes and tokens) are also useful. But when difficult attributions are made on the basis or original research in directories, archives, or other primary sources, it is essential that this research be made available to future scholars in the form of complete footnotes.
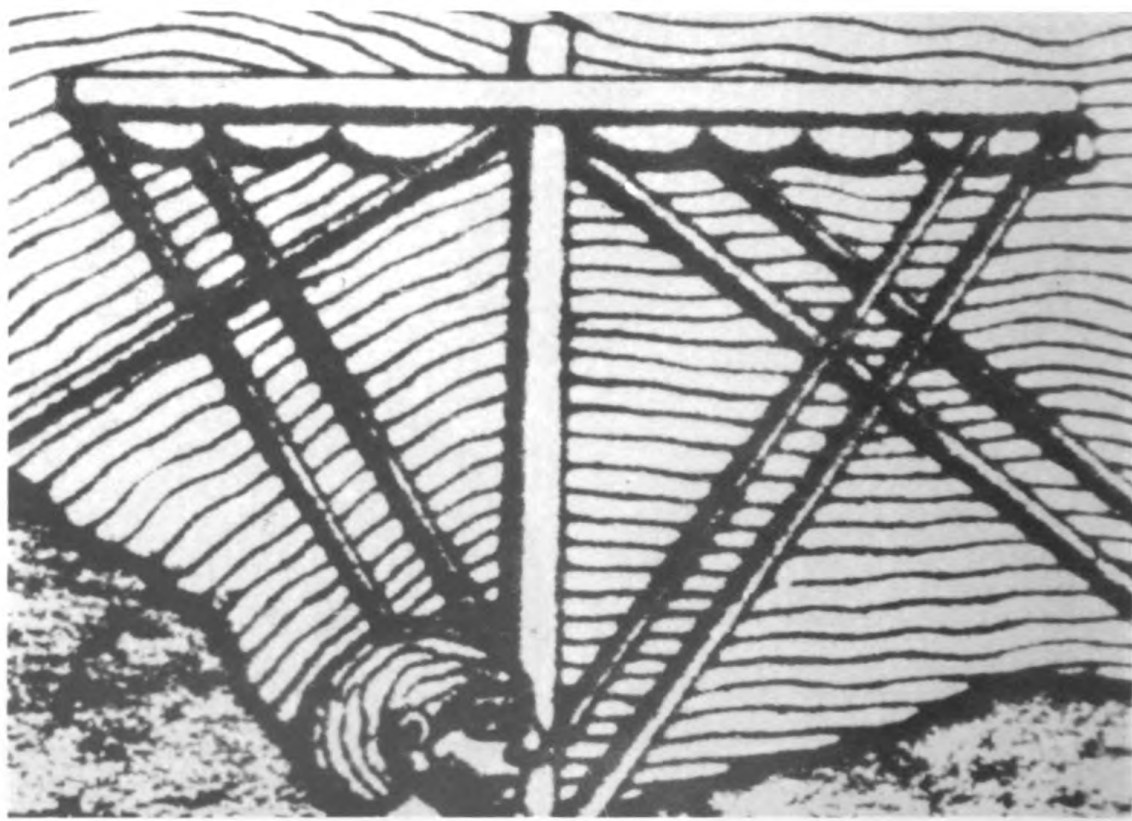
JOHN M. KLEEBERG
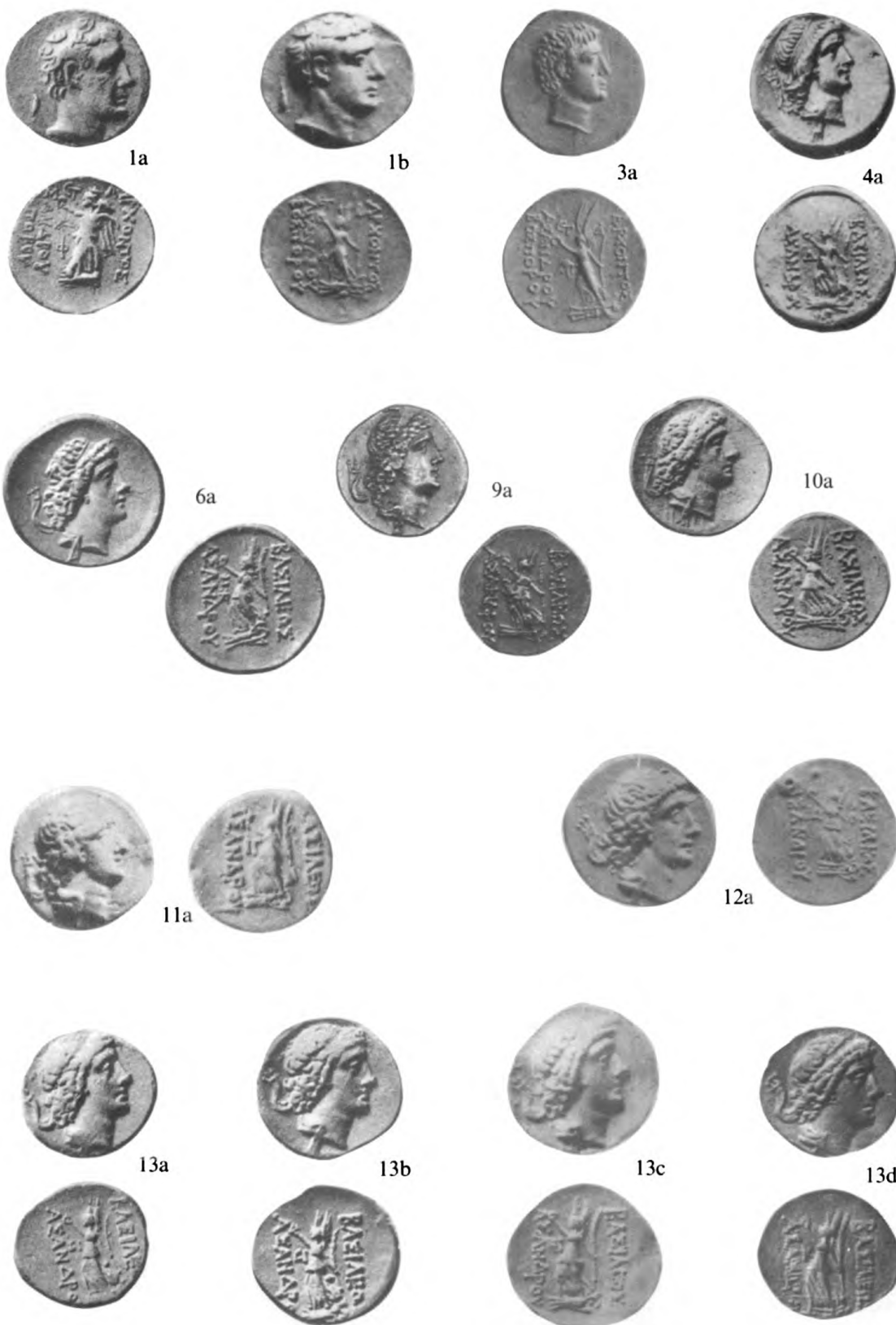The American Numismatic Society

PLATES

Plate 1

1

2

3

4

5

6

7

So-Called Triangular Sail of Sidon

Plate 2

8

9

So-Called Triangular Sail of Sidon

Plate 3

1a

1b

3a

4a

6a

9a

10a

11a

12a

13a

13b

13c

13d

Asander of the Bosporus

Plate 4

14a

20a

20b

20c

22a

24a

24a′

25a′

27a

28a

Asander of the Bosporus

Plate 5

1   2   2a   3   4   5

2x   6   7   8   9   10   11   12   13

14

15   16   17   18   19   20

21   22   23   24   25   25a   26

26a   54   53

Aksumite Forgeries

Plate 6

27 28 29 30 31 32 33 34

35 36 37 38 39 40

41 41a 38a enlarged 42 43

44 45 46 47 49

48 51 52

50
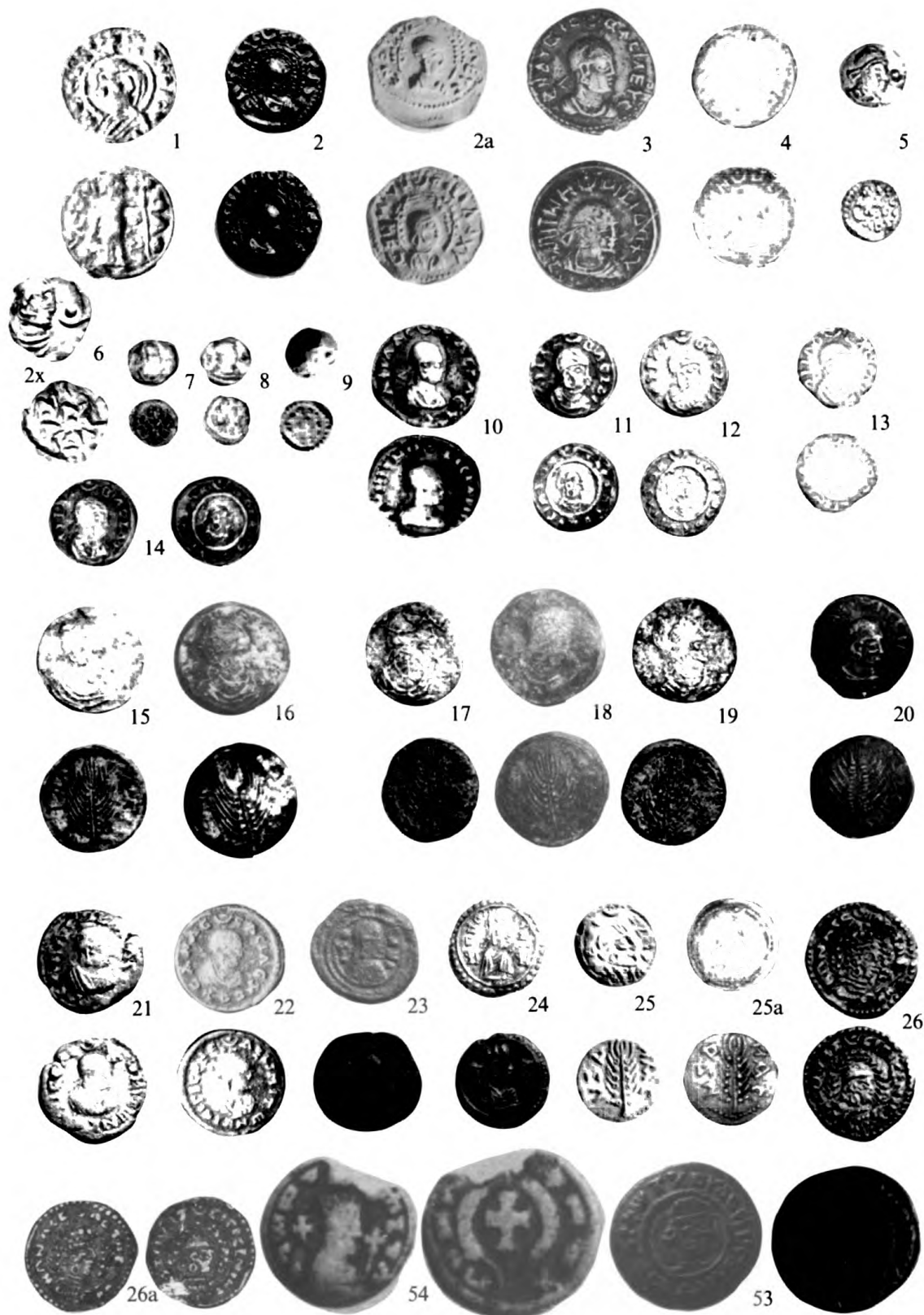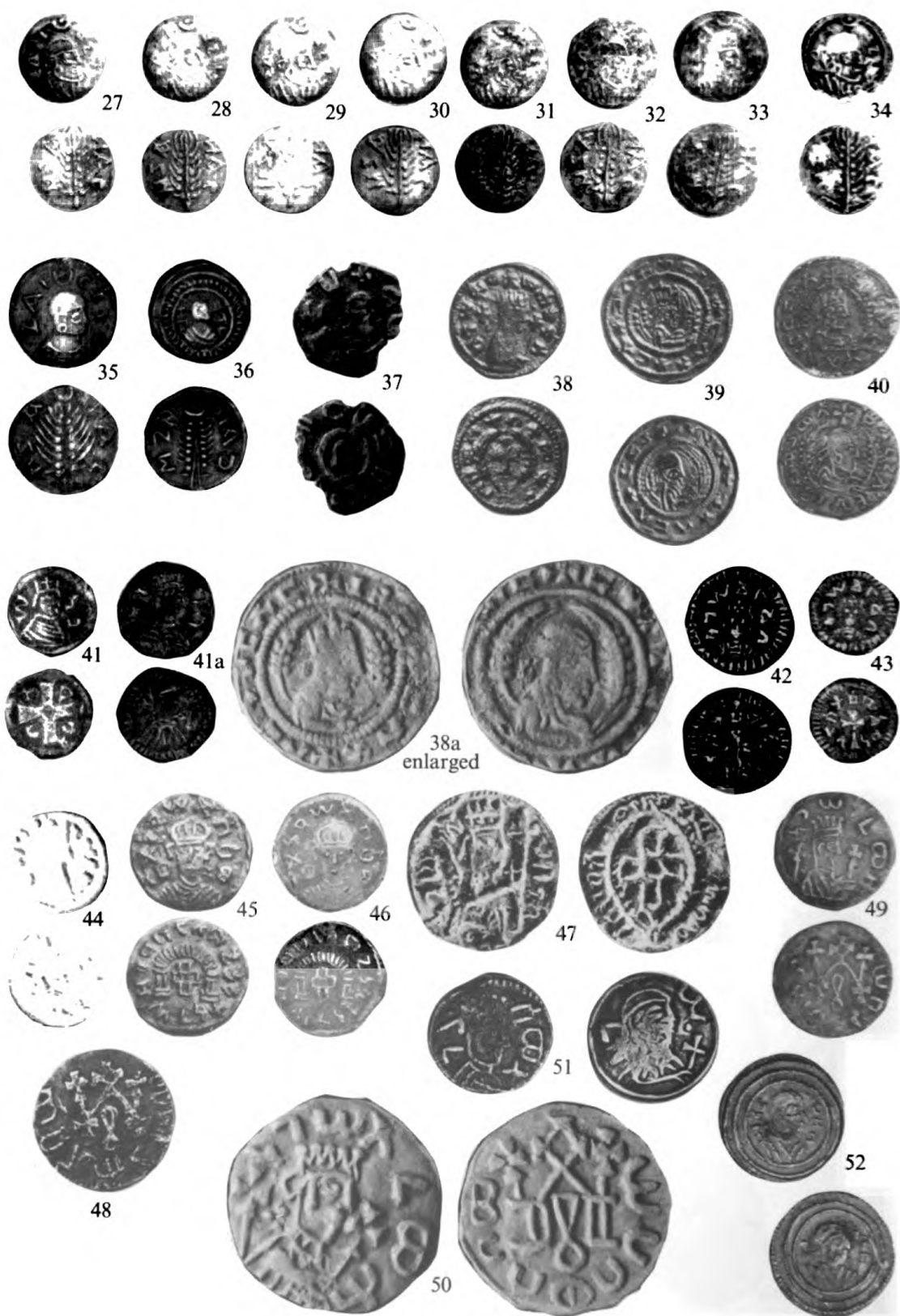
Aksumite Forgeries
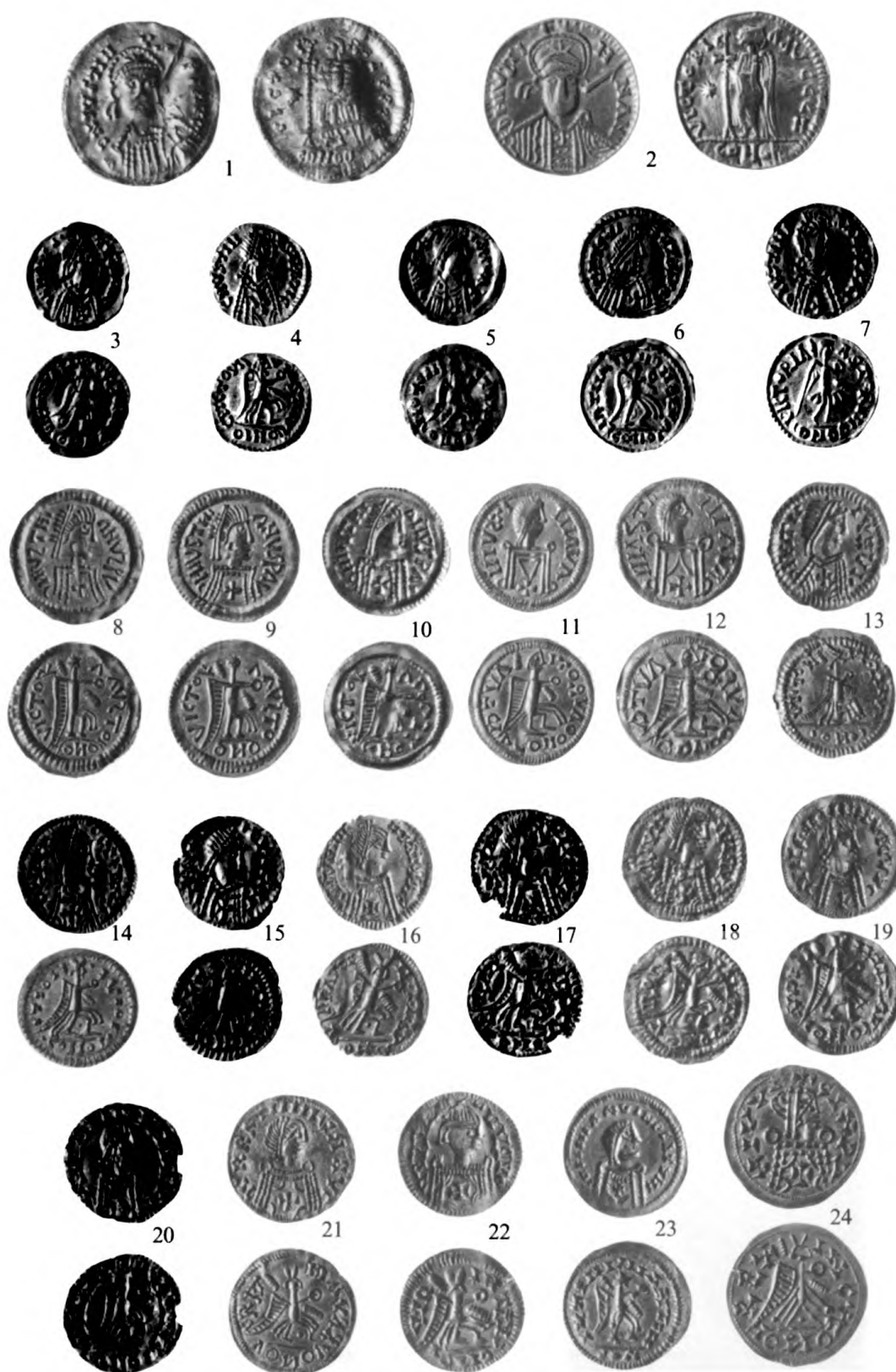
Plate 7

Visigothic Metrology

Plate 8

1

2

Divani Dated Coin

Plate 9

Sulayman the Magnificent

Plate 10

1

2

3

4

5

Varrone d'Agniolo Belferdino

Plate 11

6

7

8

Varrone d'Agniolo Belferdino
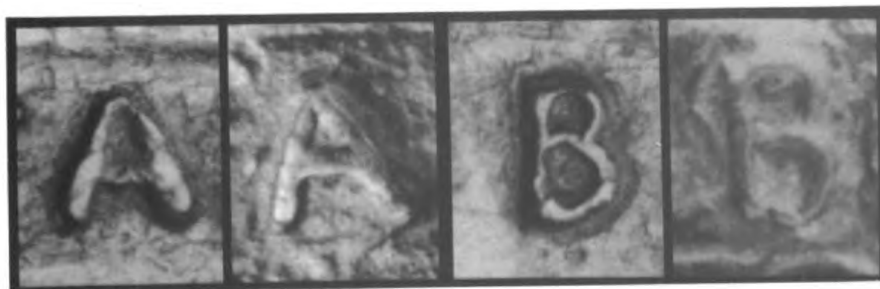
Plate 12

Varrone d'Agniolo Belferdino
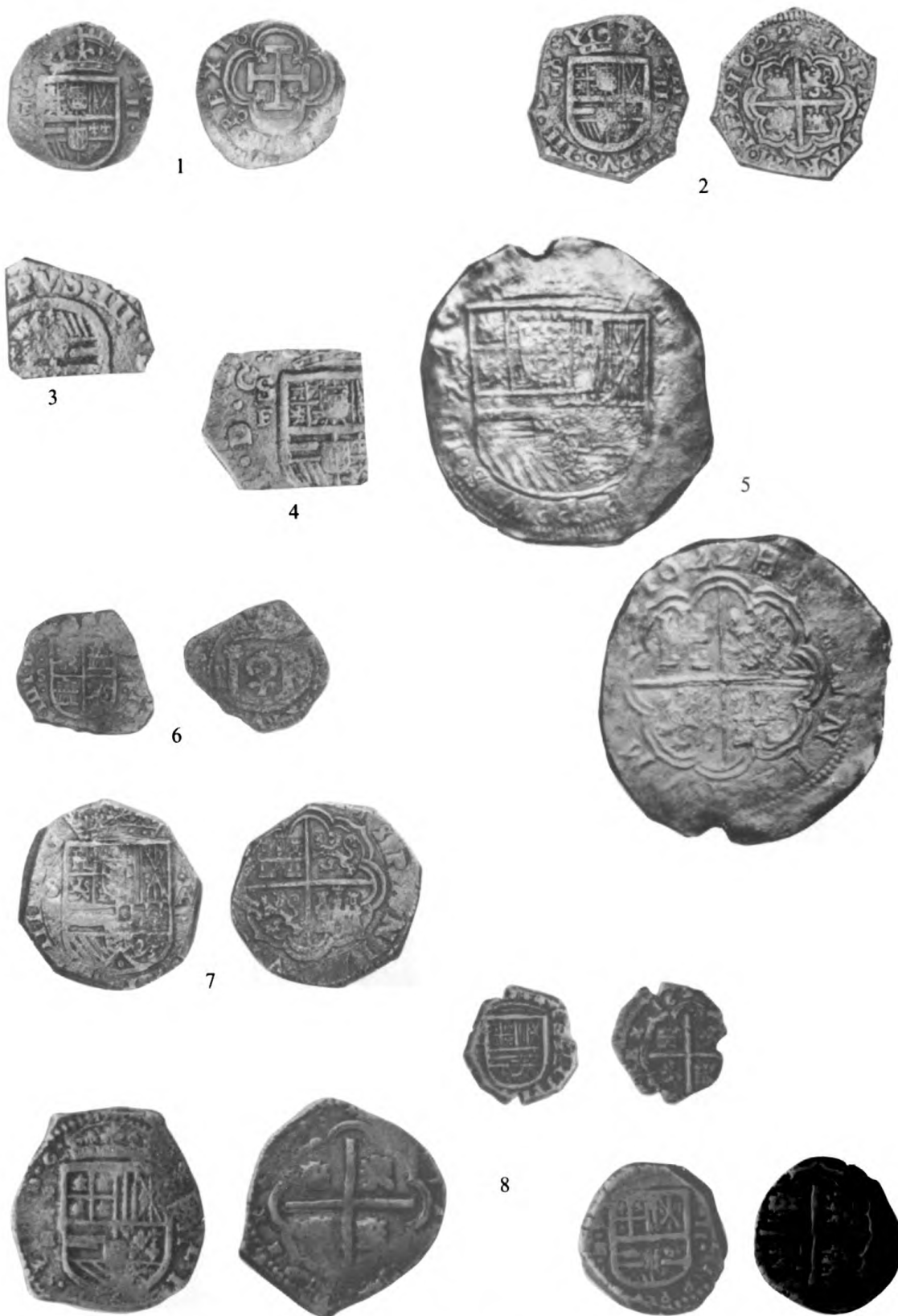
Plate 13

Cartagena Cobs

Plate 14

9

10

11

12

13

14
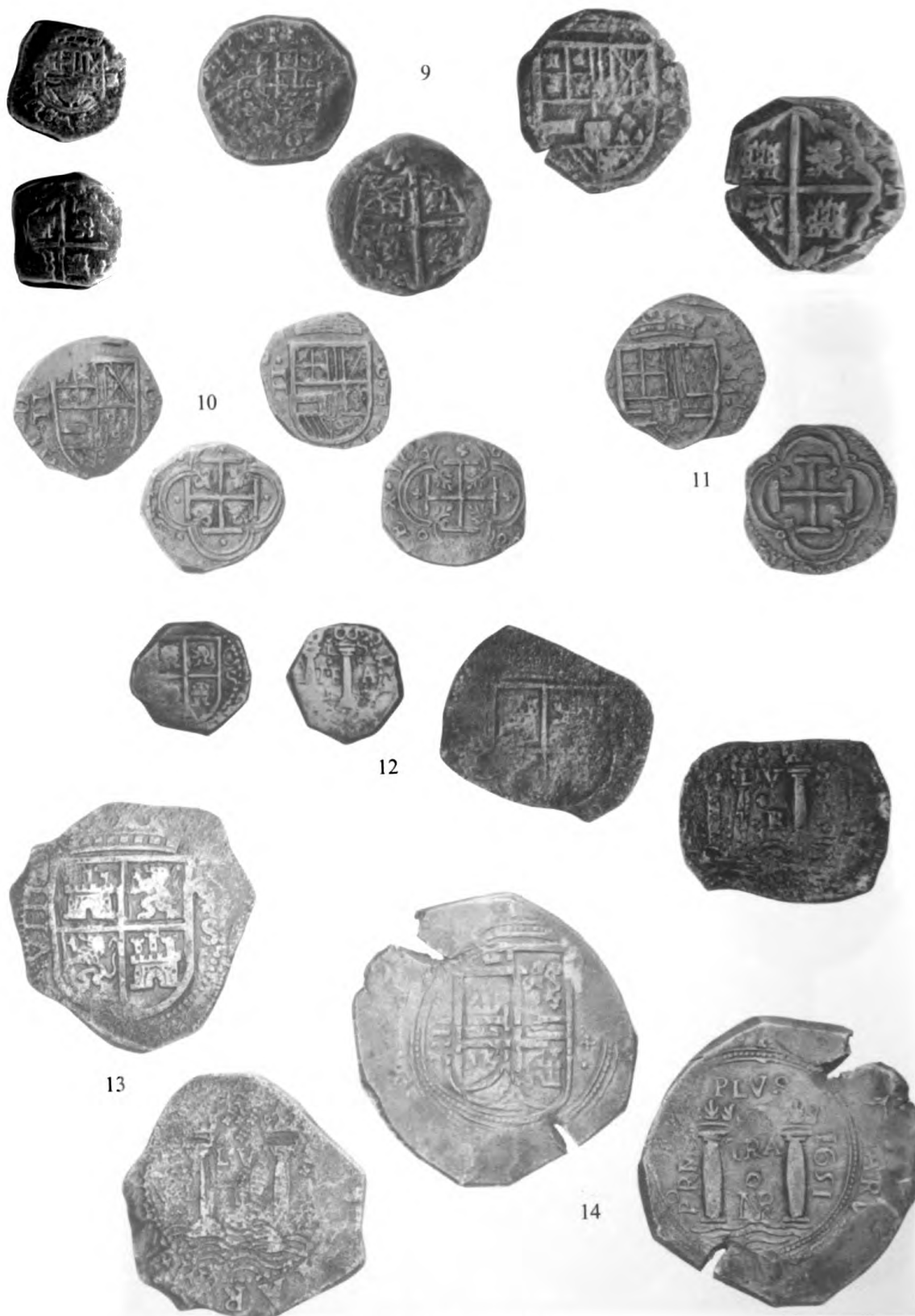
Cartagena Cobs

Plate 15

Virginia's Happy While United

Plate 16

Juaristas, Imperialistas, and Centavos

Plate 17

1 2 3 4 5

6 7 8 9 10

A B C D E

F G H

Morgantina